Keio University
Annual Report on Research Activities
2008–2009

Keio University

Creating New Knowledge Through Practical Learning

The mission of a research university is to improve education and research, and their application to fields such as medicine, thereby contributing to society and improving the well-being of human kind. For Keio University, this idea is encompassed in its founder Yukichi Fukuzawa's "spirit of practical learning," which is at the core of the University's activities. Practical learning, in other words, means to understand the real truth of things through empirical sciences such as the humanities, social sciences and natural sciences, and to solve problems based on this understanding. For over 150 years, Keio University has upheld this tradition of applying scientific empirical research to real world problems.

Japan is experiencing dramatic changes to the structure of its economy and society: the population is aging at a pace unlike any other country and the structure of the economy has also changed significantly through the global financial crisis. In such a time of great social and economic change, Fukuzawa's "spirit of practical learning" is of utmost importance. It is with this spirit that Keio University has been a leader in creating new knowledge and contributing to society at a world-class level.

With this tradition and a history of research achievements, Keio University has always been engaging itself in new and improved research. This has been made possible through a research support structure developed by identifying demands and the restructuring of systems and organizations. Initiatives include research management through a code of conduct and compliance framework; joint international research and international intellectual property activities; and funding for the development of young researchers.

The purpose of this Annual Report on Research Activities, the seventh to be published, is to disseminate information on the University's research activities. It also aims to further promote creative research and business-academia-government collaboration while building the knowledge base of the next generation. In addition to providing the latest statistical data, this report highlights current cutting-edge research and trends. We hope that you will gain an understanding of Keio University's research activities and its potential in the future.

Professor Atsushi Seike
President Keio University

Keio University

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Keio University Annual Report on Research Activities

2008-2009

* This publication describes research activities from 2008 to 2009.
Titles and positions given from p. 4 onward were as at April 2008.

Campus Research Centers and Office Organization for Research Advancement and Research Administration

Campus	Research Centers (Faculties, Graduate Schools, Institutes, and others)		Office Organization for Research Advancement and Research Administration
Mita Campus ▶P13-14	・Faculty of Letters (Year 2 to 4) ・Faculty of Economics (Year 3 and 4) ・Faculty of Law (Year 3 and 4) ・Faculty of Business and Commerce (Year 3 and 4) ・Graduate School of Letters ・Graduate School of Economics ・Graduate School of Law ・Graduate School of Human Relations ・Graduate School of Business and Commerce ・Law School	・Institute of Cultural and Linguistic Studies ・Institute for Media and Communications Research ・Institute for Economic and Industrial Studies (Sangyo Kenkyujo) ・Institute of Oriental Classics (Shido Bunko) ・International Center ・Teacher Training Center ・Fukuzawa Memorial Center for Modern Japanese Studies ・Keio Institute of East Asian Studies (KIEAS) ・Center for Japanese Studies ・Research Center for the Arts and Arts Administration ・Global Security Research Institute (G-SEC) ・Research Institute for Digital Media and Content (DMC)	Office of Research Administration, Mita Campus
Hiyoshi Campus ▶P15-16	・Faculty of Letters (Year 1) ・Faculty of Economics (Year 1 and 2) ・Faculty of Law (Year 1 and 2) ・Faculty of Business and Commerce (Year 1 and 2) ・School of Medicine (Year 1) ・Faculty of Science and Technology (Year 1 and 2) ・Faculty of Pharmacy (Year 1) ・Graduate School of Business Administration (Keio Business School) ・Graduate School of System Design and Management ・Graduate School of Media Design	・Institute of Physical Education ・Sports Medicine Research Center ・Health Center ・Keio Research Center for Foreign Language Education ・Keio Research Center for the Liberal Arts ・Research and Education Center for Natural Sciences ・SDM Research Institute ・KMD Research Institute	Office of Research Administration, Hiyoshi Campus
Yagami Campus ▶P17-18	・Faculty of Science and Technology (Year 3 and 4) ・Graduate School of Science and Technology	・Keio Leading-edge Laboratory of Science and Technology	Office of Research Administration, Yagami Campus
Shinanomachi Campus ▶P19-20	・School of Medicine (Year 2 to 6) ・Faculty of Nursing and Medical Care (Year 3) ・Graduate School of Medicine	・Center for Integrated Medical Research (Research Park) ・Center for Clinical Research ・Keio University Hospital	Office of Research Administration, Shinanomachi Campus
Shonan Fujisawa Campus ▶P21-22	・Faculty of Policy Management (Year 1 to 4) ・Faculty of Environment and Information Studies (Year 1 to 4) ・Faculty of Nursing and Medical Care (Year 1, 2, and 4) ・Graduate School of Media and Governance ・Graduate School of Health Management	・Keio Research Institute at SFC	Office of Research Administration, Shonan Fujisawa Campus
Shiba-Kyoritsu Campus ▶P23-24	・Faculty of Pharmacy (Year 2 to 4 / Year 2 to 6) ・Graduate School of Pharmaceutical Science		The Group for Research Administration, General Affairs Office, Shiba-Kyoritsu Campus
Shin-Kawasaki Town Campus ▶P25-26			Shin-Kawasaki Town Campus Office
Tsuruoka Town Campus ▶P27-28		・Institute for Advanced Biosciences	Tsuruoka Town Campus Office

Organization for Research Advancement and Administration ▶P04

Head Office of Research Administration ▶P10

Organization for Research Advancement and Administration (ORAA)

Advancement of Research at Keio University

http://www.oraa.keio.ac.jp/index-e.html
E-mail: oraa-jimukyoku@adst.keio.ac.jp

Keio University believes that its mission of returning the fruits of research to society is important. Based on the principle of "Gakujutsu Sendo (leadership for scientific progress)", the University aims to make significant contributions to international society in the 21st century through original and creative academic research. Keio University promotes numerous advanced research projects at six campuses: Mita, Hiyoshi, Yagami, Shinanomachi, Shonan Fujisawa, and Shiba Kyoritsu.

Traditionally, Keio University has been deeply involved in collaborative activities between industry, government, and academia. Activities such as commissioned research, joint research, and personnel exchanges are mainly undertaken at five research facilities: the Keio Leading-edge Laboratory of Science and Technology (KLL) at the Yagami Campus, the Center for Integrated Medical Research at the Shinanomachi Campus, the Keio Research Institute at SFC (Shonan Fujisawa Campus), the Shin-Kawasaki Frontier Research and Education Collaborative Square in Kawasaki City, and the Institute for Advanced Biosciences in Tsuruoka City.

Roles and Functions of the ORAA

The ORAA is comprised of various Centers and Committees, including: the Center for Research Promotion (CRP), the Keio Incubation Center (KIC), the Intellectual Property Center (IPC), the Keio Advanced Research Centers (KARC), the Intellectual Property Mediation Committee, and the Research Ethics Committee. Together with the Offices of Research Administration, ORAA promotes and supports all aspects of research-related activities, from the start of strategic research to the transmission and contribution of results to society. The major roles and functions of each organization in the ORAA are as follows.

Offices of Research Administration (p. 10)

Support research activities at all campuses

The campuses of Mita, Hiyoshi, Yagami, Shinanomachi, Shonan Fujisawa, Shiba-Kyoritsu, Shin-Kawasaki, and Tsuruoka each have an Office of Research Administration. Each office supports research oriented to the researcher, acts as an on-campus contact point for external organizations, and promotes research collaboration with the Organization for Research Advancement and Administration (ORAA). Specifically, the Offices provide information to researchers in areas such as research resources, research environments, and opportunities for research subsidies from inside and outside Keio University (public calls for subsidy applications), and also offer a variety of other support services including negotiations and completion of contracts for joint or commissioned research, management of research expenses and research spaces, and compilation and presentation of research results.

Keio Advanced Research Centers (KARC) (p. 9)

Supports advanced, interdisciplinary research activities

The Keio Advanced Research Center (KARC) flexibly establishes, improves or eliminates, operates, and manages personnel for research centers with organizations that cut across all University faculties and departments, and supports the revitalization of advanced, interdisciplinary research activities. Each research centers use external capital as resources for activities, and undertake these activities using a specified campus as a base (home campus). As a rule, Centers are established over a period of limited years (Center formation period). This limit on the period for the formation of Centers is expected to promote research results and the development of the research itself, in keeping with the development of research contents; for example, when a given formation period is complete, new research centers can be formed to carry on that work, or new organizations can be created within the university.

Intellectual Property Mediation Committee

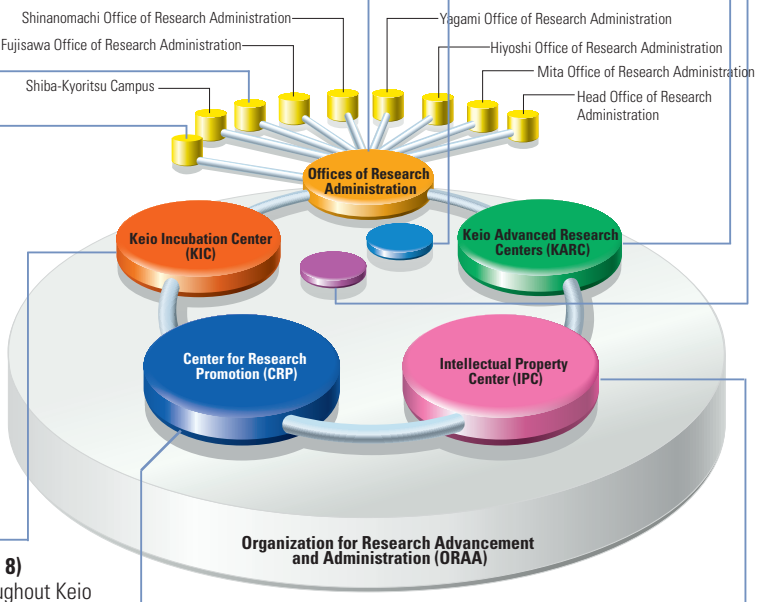
When an inventor lodges an objection regarding a given patent application, the Intellectual Property Mediation Committee acts as a mediator based on the Keio University Regulations for the Handling of Inventions.

Center for Keio Frontier Research and Education Collaborative Square (p. 25, 27)

While the University's main campuses maintain the traditional functions of research and education, The Frontier Research and Education Collaborative Square (K-FRECS) functions as a base for cutting-edge, collaborative research based on cooperation with the community, as well as essential research that cuts across various University faculties and departments.

Center for Integrated Education System

The Center for Integrated Education provides administrative support in the primary and secondary schools affiliated with Keio University.



Research Ethics Committee

The Research Ethics Committee coordinates and manages policies and regulations related to issues such as research ethics and conflicts of interest. Its main goal is to create structures that are capable of promoting fairness and safety in research activities in response to demands from society, particularly with regard to compliance problems in relation to university research activities, and the conflicts of interest that can arise in activities involving collaborations among industry, government, and academia.

Intellectual Property Center (IPC) (p. 7)

The Technology Licensing Organization (TLO) for Keio University

As Keio University's Technology Licensing Organization (TLO), the Intellectual Property Center has a wide range of responsibilities, including management and operation of intellectual property generated by the University to promoting collaborations with society based on that intellectual property. Based on applications for inventions submitted by researchers, the IPC closely examines patentability and the potential for licensing, taking into consideration the researchers' concepts of practical applications. It then makes selections, files patent applications, and maintains and controls those successful patents. These technology licensing operations open the door to a wide range of other activities, including licensing of Keio University's patented technologies to companies, the creation of new companies with foundations in intellectual property rights, and joint research with companies aimed at developing products for practical applications.

Keio Incubation Center (KIC) (p. 8)

Supports incubation activities throughout Keio University

The aim of the Incubation Center is to be an organization that supports and advances new business creation together with industry at each campus, from the preliminary stage of education and research to the return of research achievements to society. The Incubation Center 1) plans and examines systems and mechanisms (funding support schemes,etc.) that are necessary to support new ventures, 2) formulates rules and guidelines for incubation activities, 3) conducts surveys and collects statistics for incubation activities and ventures originating from the University, 4) builds and maintains internal and external incubation support networks, 5) and supports the management of incubation facilities. In addition, the KIC provides public relations, information on entrepreneurial education programs, and contest management for incubation activities and ventures originating from the Keio University.

Center for Research Promotion (CRP) (p. 5)

Promote comprehensive between industry, government, and academia

The Center for Research Promotion (CRP) plays the role of general producer for planning and promoting integrated and strategic research efforts based on collaboration between industry, government and academia. In addition, the CRP serves as a gateway to coordinate collaboration between companies, universities, and research institutes in Japan and overseas. CRP is responsible for advancing interdisciplinary research and comprehensive research collaboration. Specifically, the CRP advances joint research projects through discovering and combining university resources that match business needs. It supports the application process to obtain public funding on research themes together with industry. The CRP manages university research grant-in-aid to support joint research between industry, government, and academia. Through symposiums, it also advances exchange and communication of research results with external organizations. These activities are advanced through discussions with the CRP Advisory Board.

Center for Research Promotion

Combined promotions targeting industry-government-academia collaboration

http://www.crp.keio.ac.jp/en/index.html
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The Center for Research Promotion functions as a general contact point in the planning and promotion of comprehensive strategic research by industry, government, and academia, and in collaborations with companies, universities, research institutes in Japan and overseas.

Specific activities include: purposing plans for technology exchanges with companies, universities, and external research institutes; promoting joint and contract research; completing comprehensive collaboration contracts; promoting research that combines fields within Keio University; planning and hosting open symposiums; and securing outside research capital.

1 Collaborations with outside institutions

In order to promote collaborative creation with outside institutions, including companies, municipal governments, independent administrative agencies, incorporated foundations, and other universities, The Center for Research Promotion supports the creation of infrastructures and systems by maintaining information, human networks, and frameworks. It has already completed collaboration agreements and is undertaking activities with Nippon Telegraph and Telephone Corporation (NTT) and Kyoto University, and has established new collaborations during the current fiscal year as well.

(1) Collaboration agreement with Sony Corporation on the "Fostering of next-generation scientists and engineers project" (November 4, 2008)

As a new form of industry-academia collaboration with Sony Corp., Keio University agreed on medium-term collaboration with Sony Corp., through manpower exchanges, joint research, etc., in other to strengthen fostering of human resources in the field of technologies that will be a driving force in the next generation. A press conference was held to announce the agreement.
Based on this agreement, a variety of activities has begun including joint research and development project for cell applications by graduate students, internships, and the establishment of donated lectures. In the future, taking advantage of Sony's advanced R&D capabilities as a global corporation and Keio University's educational and fundamental research capabilities, Sony and Keio aim to roll out the industry-academia collaborations with the strengths of both from a long-term perspective, and to contribute to the further development of business and education communities.

At the joint press conference on the collaboration project

(2) Implementation of the "Next-generation Web technology joint development program 2008" with Itochu Corp. (July 1, 2008)

Itochu Corporation, Waseda University and Keio University form a joint partnership to promote a student support and development program for future entrepreneurs in the next generation web technology field. The goal of this program is to seek out and foster innovative, creative ideas and technologies that will contribute to the creation of next generation web technology field, and to support and foster students wishing to start up businesses in this field. The program is promoted through a collaboration of Itochu Corporation, Waseda University, and Keio University.
Using a contest style format, students of both universities are asked to proposals based on open mind thinking, and outstanding proposals are presented with awards and research support. At the same time, practical assistance being given to the realization and the future commercial application of the planned proposal. Students who achieved particular success were invited to Silicon Valley in the United States in March 2009.

(3) Completion of a collaboration agreement with RIKEN Japan (December 10, 2008)

Keio University and RIKEN concluded a new comprehensive partnership agreement towards the slogan "Creative intelligence, leading the world".
Keio University and Riken signed a comprehensive agreement with a long-term view to the future, aiming towards the creation of "intelligence to lead the world". The agreement sets the groundwork for interdisciplinary collaboration between the organizations across diverse areas of research and education through the shared development of human resources and coordination between administrative departments.
Specific activities have already begun; for example, Research Center for Human Cognition was established by researchers from both institutes in April 2009.

At the signing of the basic agreement

(4) Completion of an agreement on the establishment of the Japanese-French Laboratory for Informatics (JFLI) (December 2, 2008)

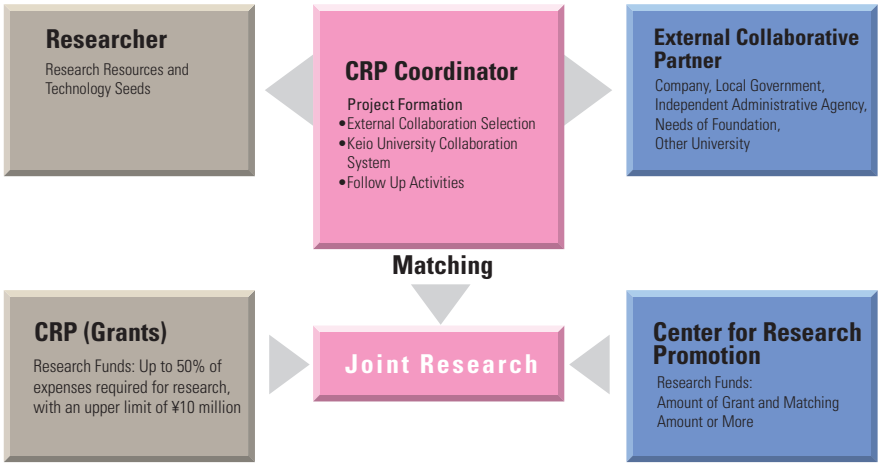
Five institutions - the National Institute of Informatics (NII), the Centre National de la Recherche Scientifique (CNRS), the University Pierre et Marie Curie (UPMC), the University of Tokyo, and Keio University - completed an agreement regarding the establishment of the Japanese-French Laboratory for Informatics (JFLI). The goal of this laboratory is to promote joint research and research exchanges in the field of informatics. It is expected to act as a venue for active interactions and collaborations between Japanese and French informatics researchers, and to generate substantial results.

(5) Completion of the basic agreement on the promotion of advanced medical development by the School of Medicine (Super special consortium for supporting the development of cutting edge medical care), the City of Kawasaki, and the Central Institute for Experimental Animals (April 23, 2009)

"Super special consortium for supporting the development of cutting edge medical care", represented by Professor Hideyuki Okano of the Keio University School of Medicine, the City of Kawasaki, and the Central Institute for Experimental Animals signed an agreement to collaborate in the establishment of a core life science research facility. The goal of this new facility will be to act as a bridge between fundamental research and clinical research and to promote innovative research in the field life-sciences in order to develop innovative medical treatments such as regenerative medicine targeting central nervous system. The results of this research will then be used to improve the welfare of Japanese citizens and to revitalize industry. In the future, this new research facility will collaborate with research institutes, pharmaceutical companies, venture companies, and other entities in promoting "Super special consortium for supporting the development of cutting edge medical care" involving regenerative medicine targeting the central nervous system, in order to contribute to integrated and efficient activities fundamental research, preclinical trials, and clinical trials.

2 The External Collaborative Research Creation Fund

This new grant system, which was set up in FY2008, uses technology seeds and research resources within Keio University to build broad ranging collaborative structures with external institutes, and to support the start up of joint research targeting important social and academic issues on a scale that would have been difficult to achieve in the past.
Screening of recipients was conducted with an emphasis on the novelty of research activities (new research themes, new collaborative partners, and new research teams) and on the social impact of the proposed research.
Six research proposals were selected in FY2008. The selected research themes were presented at symposiums and academic societies, and in the form of research papers. Further expansion and development is expected in the future, as this research moves toward practical applications in new drug development, clinical applications, and advice to government agencies.



Example of Selected Research Project in FY2008

Research theme: Governance structures in a civil society
Research representative: Yoshiaki Kobayashi, Professor, Faculty of Law and Political Science
External collaboration partner: Fukui Prefecture

The goal of this research, which was conducted in collaboration with Fukui Prefecture, was to construct a system design that would provide citizens with the incentive to effectively promote measures to prevent global warming. On November 26, 2008, a symposium entitled "Joint research contributing to the global warming environment" was held jointly with Fukui Prefecture at the Mita Campus G-SEC, as a venue for presenting intermediate results. At this symposium, Governor Nishikawa of Fukui Prefecture gave a speech on activities at the prefectural level, and Professor Kobayashi from the Keio University Faculty of Law and Political Science gave a presentation of environmental contributions through Japan with a focus on electrical power supply and demand, as well as research methods for visualizing these figures on a map and advice in the creation of government policy. In March 2009, the "Global Warming and Environmental Contribution Index" (Keio University Press) was published, introducing for the first time an Environmental Contribution Index specific to each prefecture in Japan, which was one outcome of research over the past year, and which drew a dramatic response from regional governments throughout the country.

At the symposium for announcing intermediate report results

3 Communicating research results to society and promoting research interactions through a symposium

"IBM Day at Keio University ~Global Innovation to the Future~" (October 15, 2008)

It has hold to support global innovation and with various lectures and forum discussions for students on the newest research and technologies.
Following a presentation on research and technologies that create innovations, there were parallel sessions including a forum for female students and foreign students on research activities and employment, and a panel discussion "Generation Deep Dive" round up discussion about the future of Japan featuring four students from Keio Univ., representatives of the Ministry of Economy, Trade and Industry, economists, and consultants, who deliberated on the theme of "Education, Working styles, and Politics." Both these sessions resulted in active exchanges of opinions by all those present. An "IBM Awards" ceremony was also held, and two researchers from Keio University received awards.


At the panel discussion

Keio University and Kyoto University hosted a joint symposium at Kyoto University on the first anniversary of seal an agreement. (December 4, 2008)

The symposium began with opening remarks from President Hiroshi Matsumoto, Kyoto University and Vice President Jun Murai, Keio University. Professors from both Universities gave presentations on three fields where substantial results have already been achieved through joint research: life sciences, economics, and IT. These three presentations gave a very clear picture of how the collaboration agreement has expanded and enhanced the collaborative relationship between Keio University and Kyoto University, for example in terms of joint research. In the future, Keio University and Kyoto University will strive for broader and deeper collaborations in education, research, and human resources.

The 5th Keio University Advanced Science and Technology Symposium: "Future Medical Research made possible by iPS cells" (February 4, 2009)

A symposium on the outlook for clinical applications of iPS cells was held in the West School Building Hall on the Mita Campus. Lectures were given by researchers representing four bases of research in iPS Cells (induced pluripotent stem cells), including Professor Hideyuki Okano of the Keio University School of Medicine and Professor Shinya Yamanaka of Kyoto University, as well as numerous others on the front lines of this field, representing NPOs, companies, academism, government, and organizations for patients with spinal disorders. About 900 persons participated in this very successful symposium, including researchers, students, patients' organizations, and regular citizens.


Symposium Lectures

Intellectual Property Center

Technology transfer activities

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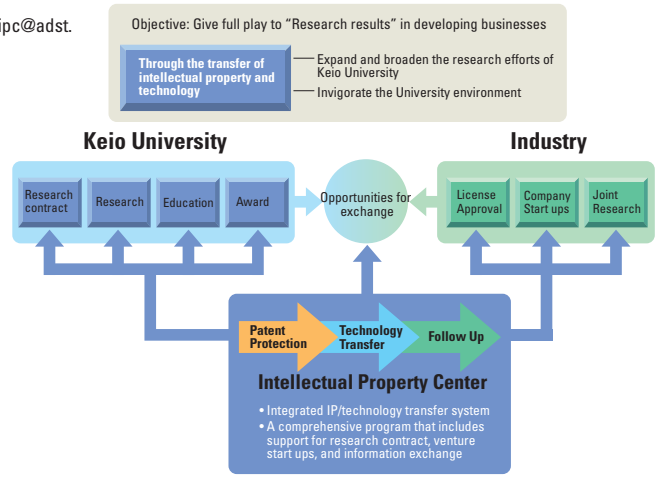
The transfer of technologies from universities to the industrial world began with the enactment of the "Act on the Promotion of Technology Transfer from Universities to Private Business Operators" in August 1998. Keio University established the Intellectual Property Center in November 1998, and has undertaken leading activities aimed at returning the benefits of research created by the university as an authorized Technology Licensing Organization (TLO) to society in the form of products and technologies.

In an environment of intense global competition in the 21st century, the enterprise development structure is becoming more selective and focused. At the same time, the third vehicle of return and the solutions in advanced research fields that contribute to future commercial applications both fall in synch with industry's expectations towards universities.

To develop these activities even further, the Intellectual Property Center is working on deepening research in Keio University and extending it to businesses from an international perspective.

Keio University IPC Activities



Teachers, staff, and students are given the opportunity to interact with intellectual property, with the goal of offering practical, real-world education and enhancing the dynamism of Keio University.

1 Promoting intellectual property and technology transfer activities

Our goal is to return expanded benefits of research results at Keio University to society by transferring technologies to industry in Japan and around the world. This includes all aspects of technologies, including materials and knowhow with a particular focus on copyrights for programs and patents created by researchers in the various faculties and departments on Keio University's campuses.

Technology transfers are conducted in three forms: (1) Licensing to companies; (2) joint research with companies based on Keio University's intellectual property; and (3) the creation of venture companies based on Keio University's intellectual property.

2 Creating a venue for information exchanges between industry and academia

(1) Leading Innovation Network (at G-SEC)
The "Leading Innovation Network," a series of gatherings to introduce technologies in various technology fields, was established to transfer research results from Keio University to industry in the form of concrete technologies.
- Gathering held on October 30, 2008 (Engineering field)
"Chemical sensing materials and chemical sensors"; Professor Koji Suzuki; Department of Applied Chemistry, Faculty of Science and Technology
"Development of diamond electrode sensors"; Associate Professor Yasuaki Einaga, Department of Chemistry, Faculty of Science and Technology
"Functionality of polymers made from diamond-like carbons"; Associate Professor Atsushi Hotta, Department of Mechanical Engineering, Faculty of Science and Technology
- Gathering held on January 16, 2009 (Bio field)
"Cancer treatments targeting molecules that simultaneously control cancer metastasis and immunosupression"; Chie Kudo, Assistant Professor, School of Medicine
"3rd Generation treatments for Alzheimer's disease which control the death of nerve cells"; Masaaki Matsuoka, Associate Professor, School of Medicine
"The new world of medical treatment and bio made possible by puromycin technologies"; Professor Hiroshi Yanagawa, Department of Biosciences and Infomatics, Faculty of Science and Technology

(2) Venture Private Conference (at G-SEC)
This conference, held at the Mita Campus G-SEC on July 2-3, 2008, and January 27-28, 2009, included presentations by venture business managers on business strategies and the outlook for the future, as well as introductions of specific businesses.

(3) Forums and symposiums
1. International Technology Transfer Forum (at G-SEC)
The International Technology Transfer Forum was held on October 10, 2008, on the theme of "Experiences in research collaborations and technology transfers with overseas institutions, and expectations of universities." The Forum welcomed Yoshio Matsumi, Senior Advisor and General Manager of the Innovative Technology Business Development Office at Itochu Corporation.
2. International Industry-Government-Academia Collaboration Symposium (at the North Building Hall)
An International Industry-Government-Academia Collaboration Symposium entitled "The future outlook for Global Industry-Government-Academia Collaboration: 10 years of activities at the Keio University Intellectual Property Center" was held on December 16, 2008.
On March 17, 2009, another International Industry-Government-Academia Collaboration Symposium was held, entitled "Current status and issues in technology transfers at Japanese and American universities: American university TLO practices that we want to hear about once more." This Symposium welcomed speakers and panelists including the President of Todai TLO Ltd. and TLO specialists from Stanford University and the University of Wisconsin in the U.S.
3. Private University Industry-Academia Collaboration Forum (at the Ono Memorial Lecture Hall, Waseda University)
The "5th Kanto-Kansai 10 Private University Industry-Academia Collaboration Forum: "Innovations and Inter-university collaborations" was held on November 28, 2008, as a joint project by 10 university TLOs in the Kanto and Kansai regions: Chuo University, Tokyo Denki University, Nihon University, Meiji University, Waseda University, Kansai University, Kwansei Gakuin University, Doshisha University, Ritsumeikan University, and Keio University.

3 Intellectual Property Center Awards/Education

(1) Intellectual Property Center Awards
The Intellectual Property Center Award was established in 2000 and is presented each year to promote the activities of the Intellectual Property Center within the University, and to communicate the University's new initiatives to society. The 9th Award, in 2008, was presented to Professor Yasuo Ikeda and Associate Professor Masataka Kuwana of the School of Medicine, for creating a "Thrombocytopenia (reduced blood platelet count) diagnosis technology."

(2) Intellectual Property Center courses
A course on "General theory of intellectual property" was established at the Intellectual Property Center from 2008. This course is operated using capital from the Nateglinide Memorial Toyoshima Research and Education Fund to provide educational opportunities in relation to intellectual property.

4 Industry-Government-Academia Collaboration Strategy Development

In 2008, two fields were selected by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) as part of its Industry-Government-Academia Collaboration Strategy Development program: "Promoting international Industry-Government-Academia Collaboration activities," and "Strengthening intellectual property activities related to iPS cells." The Intellectual Property Center has taken a central role in the following contracted business operations in collaboration with the Organization for Research Advancement and Administration (ORAA) Incubation Center and the Center for Research Promotion.

(1) Promoting international Industry-Government-Academia Collaboration activities
1. Model themes include handling of international research results, establishment of confidentiality and other rules, establishment of international intellectual property strategies, and support for international research activities
2. International forums and symposiums
   a. International Technology Transfer Forum
   b. International Industry-Government-Academia Collaboration Symposium
3. Collaborative investigative research on incubation seeds using the SOI Asia Network
4. Creating English-language videos introducing research and patent seeds, and using an English-language intellectual property/research PR website to secure international joint research and contract research and to conduct international technology transfer activities

(2) Strengthening intellectual property activities related to iPS cells
An iPS cell research intellectual property strategy team was set up in April 2008, to strengthen IP activities at the Keio University Center, which is one of four research centers in the Ministry of Education, Culture, Sports, Science and Technology (MEXT) studying iPS cells and related issues. The team's activities include:
1. Rapid and accurate acquisition of intellectual property (seeking out and securing intellectual property)
2. Intellectual property acquisition strategy measures and support for research from an intellectual property perspective
3. Support in enhancing research environments related to intellectual property
4. Support in technology transfers and the completion of contracts
5. Information exchanges and collaborations with Kyoto University and other iPS cell research institutions in Japan

Incubation Center

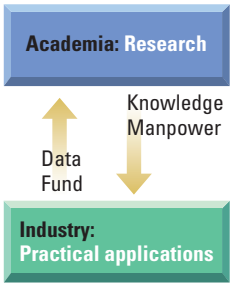
Supporting and promoting incubation and fostering people with "Entrepreneurship"

http://www.kic.keio.ac.jp/
E-mail: incu-jimu@adst.keio.ac.jp

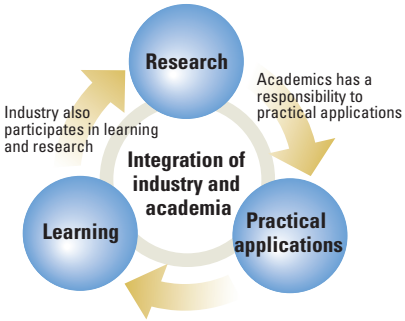
Since its establishment, Keio University has been giving back knowledge to the community through education and research activities. "Giving back knowledge to the community" is at the heart of university activities aimed at fostering people with entrepreneurship and the process of creating new business by sublimating the results generated by universities into sustainable frameworks in the form of business (the process of "Incubation"). These activities should therefore be undertaken as an integrated part of research and education activities, rather than being separated from them.

The way in which a university gives back knowledge to the community should not be limited to the traditional approaches of "Providing knowledge and manpower." Universities must promote incubation based on a stance of "Collaborating with industry from the stage of education and research, and taking responsibility even up to the practical application of the results."

Based on these policies regarding the creation of new business, the KIC and the each campus works in collaboration with industry from the education and research stage through to the point where the results are returned to the community, with the goal of promoting the creation of new business and the creation of economic and social value.



Traditional division of responsibilities



Ideal form of collaboration between industry and academia

1 Support for university-based venture companies

The Incubation Center continues to provide support and information; in September 2008, it published a pamphlet in Japanese and English summarizing its activities, and in December, it published an "Entrepreneurship Handbook for University Teachers and Students," which offers a wide range of information related to entrepreneurship.

Incubation Center Pamphlet

Entrepreneurship Handbook for University Teachers and Students

At the end of FY2008, a total of 61 venture companies originating at Keio University had been established with the involvement of teachers and students (17 of these venture companies were established based on intellectual property).

Top universities creating venture companies in 2008

Ranking	University	No. of companies
1	Waseda University	6
2	Kyushu University	5
3	The University of Tokyo	4
3	University of Tsukuba	4
5	Keio University	3
5	The University of Digital Content	3
7	Hokkaido University	2
7	The University of Tokushima	2
7	Kanazawa University	2
7	University of Fukui	2

Top 10 universities establishing venture companies in 2008 (cumulative base)

Ranking	University	No. of companies	Last year order
1	The University of Tokyo	125	1st
2	University of Tsukuba	76	5th
3	Osaka University	75	2nd
4	Waseda University	74	3rd
5	Kyoto University	64	4th
6	Tohoku University	57	7th
6	Tokyo Institute of Technology	57	9th
8	Kyushu University	55	8th
9	Keio University	51	6th
10	Kyushu Institute of Technology	45	11th

*The above figures show the number of venture companies currently active.

2 Creation and maintenance of a network for supporting incubation activities inside and outside of Keio University

The Incubation Center has created and maintains a network for support activities through information exchanges and collaborations with organizations inside and outside of Keio University. Following is an outline of specific activities in FY2008.

(1) Information exchanges with an audit corporation (AZSA & Co.)
(2) Information exchanges with venture-capital organizations (Nippon Venture Capital Co., Ltd.; JAFCO Co., Ltd., etc.)
(3) Information exchange with the Shonan Fujisawa Office of Research Administration, the SFC forum, KIEP, MM Co., Ltd., and other incubation partners, positioning of these organizations, and confirmation/coordination regarding these collaborations
(4) Creating an organization that supports various Forums:
- Cooperation with the SFC-IV Entrepreneurship Forum
- Cooperation with the KIEP Forum
(5) The SOI Asia Business Platform Limited Liability Partnership, which had been planned and studied since 2007, was formally established in June 2008.
Keio University and the SOI Asia Business Platform Limited Liability Partnership completed a contract and began studying the creation of incubation business in Asian networks.

3 Support in the operation of incubation facilities (Keio Fujisawa Innovation Village)

At the end of March 2009, Keio Fujisawa Innovation Village had 23 tenant organizations (including individuals). (12 of these organizations are University related, six are local venture companies, and five are venture companies from outside the city.) Activities undertaken within these facilities include the establishment of companies and support in finances, accounting, an intellectual property by incubation managers; venture business advice meetings by outside specialists; introductions of university researchers; and support in acquiring various types of grants and subsidies. Through these support activities, two organizations from Keio Fujisawa Innovation Village were established as corporations in FY2008 (cumulative total: 11 companies).

4 Meetings, etc.

(1) Incubation steering committee staffs were assigned from each campus, and committee staff meetings were held in July and March.
(2) An Incubation Center Director's Office and a space for the execution of Administrative Division activities were established in January 2009 within the Organization for Research Advancement and Administration (ORAA) Secretariat on the Mita campus.

5 Participation in the Industry-Government-Academia Collaboration Strategy Development program

In 2008, the following operations were undertaken as part of Industry-Government-Academia Collaboration Strategy Development program by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) to survey, study, and establish "SOI (School on Ineternet) Asia" as a test case for venture capital business through collaborations between the Center for Research Promotion and the Intellectual Property Center in the Organization for Research Advancement and Administration (ORAA).

1. Surveys to seek out seeds for new business in Asia (including on-site surveys at five universities in Asia)
2. Meetings inviting representatives of five Asian universities (held in Indonesia)
3. Operation of a Business Idea Contest
4. Management of course contents for Asian universities (including intellectual property education in collaboration with the Intellectual Property Center)
5. SOI (School on Internet) Asia distance education project (development of new cases, translation of Japanese cases into English, and renewal of the homepage)

Keio Advanced Research Centers (KARC)

Supporting revitalization of advanced, interdisciplinary research activities

http://www.karc.keio.ac.jp/index-e.html
E-mail: karc-jimu@adst.keio.ac.jp

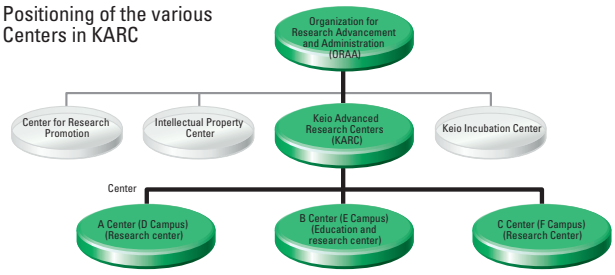
Keio University established the Keio Advanced Research Centers (KARC) in February, 2007 in response to an increasing number of requests to form new types of research centers (or education and research centers) that merge and connect a wide range of research fields.
KARC flexibly establishes, improves or eliminates, operates, and manages personnel for research centers with organizations that cut across all University faculties and departments, and supports the revitalization of advanced, interdisciplinary research activities.
The research centers use external capital as resources for activities, and undertake these activities using a specified campus as a base (home campus).
As a rule, Centers are established over a period of five years (Center formation period), but this period can be extended to 10 years if conditions (capital, etc.) are met. This limit on the period for the formation of Centers is expected to promote research results and the development of the research itself, in keeping with the development of research contents; for example, when a given formation period is complete, new research centers can be formed to carry on that work, or new organizations can be created within the university.

1 Unique features of KARC

Thirty-four Centers were created after the establishment of KARC. Five of these Centers have already completed their activities. Following are some of the unique features of KARC:
- It forms advanced, strategic research centers at Keio University.
- It proposes and develops new fusion areas not restrained by frameworks of existing academic disciplines.
- It constructs organizations that are capable of handling dynamic research projects.
- It closes research centers to enable them to efficiently complete their missions.

KARC has also introduced a unique concept called "Starting Up Center (SU)". It is a preparatory center for research groups with clear academic objectives and concrete plans to use in setting up a more formal research center later. In 2008, three centers among 11 were set up under this scheme.

Positioning of the various Centers in KARC



2 The Aim of KARC

KARC is an interface for a wide range of centers that are representative of Keio University. It operates these centers in a wide range of formats, including Global Centers of Excellence and centers funded by Japanese public funds (such as the Special Coordination Fund for the Promotion of Science and Technology), as well as EU Centers of Excellence and centers undertaking joint research with private corporations. Campuses hosting such research centers can be found on virtually all of Keio University's campuses: Mita, Hiyoshi, Yagami, Shinanomachi, Shonan Fujisawa, and Shin-Kawasaki.
KARC seeks to utilize the unique characteristics of the centers' respective faculties and campuses and merging those characteristics to create new frameworks for and approaches to carrying out research at Keio University.

Centers within KARC (as of June 23, 2009)

Center Name	Center Director		Period	Home Campus
Center for Human Metabolomic Systems Biology	Professor, Graduate School of Medicine	Makoto Suematsu	2007/02/01～2012/03/31	Shinanomachi
International Center of High-Level Global Cooperation for Leading-Edge Platform on Access Spaces	Professor, Graduate School of Science and Technology	Kouhei Ohnishi	2007/02/01～2012/03/31	Yagami
Centre for Advanced Research on Logic and Sensibility	Professor, Graduate School of Human Relations	Shigeru Watanabe	2007/02/01～2012/03/31	Mita
GSP Center (Center for Genome Super Power)	Professor, School of Medicine	Jun Kudo	2007/06/01～2010/05/31	Shinanomachi
Center for Integrative Mathematical Sciences (CIMS)	Professor, Graduate School of Science and Technology	Yoshiaki Maeda	2007/05/01～2011/03/31	Yagami
The Center for Civil Society with Comparative Perspective (CCC)	Professor, Graduate School of Law	Yoshiaki Kobayashi	2007/04/01～2012/03/31	Mita
Co-Mobility Society Research Center	Professor, Faculty of Science and Technology	Hironao Kawashima	2007/07/01～2010/03/31	Shin-Kawasaki
Market Quality Research Center at Keio University	Professor, Faculty of Economics	Eiji Hosoda	2007/09/01～2012/03/31	Mita
Panel Data Research Center at Keio University	Professor, Faculty of Business and Commerce	Yoshio Higuchi	2007/09/01～2012/03/31	Mita
Education and Research Center for Stem Cell Medicine	Professor, School of Medicine	Hideyuki Okano	2008/01/01～2012/12/31	Shinanomachi
Keio Jean Monnet COE Centre for EU Studies	Professor, Faculty of Law	Katsuhiro Shoji	2007/09/01～2012/08/31	Mita
Media Design Research Center	Professor, Graduate School of Media Design	Masahiko Inakage	2008/02/01～2013/01/31	Hiyoshi
Research Center for Life - Conjugated Chemistry	Professor, Faculty of Science and Technology	Koji Suzuki	2008/03/01～2011/03/31	Yagami
Center of Governance for Civil Society	Professor, Faculty of Law	Yoshihisa Hagiwara	2008/03/01～2010/02/28	Mita
Work - Life Balance Research Center	Professor, Faculty of Nursing and Medical Care	Kaeko Yamashita	2008/07/01～2011/03/31	Shonan Fujisawa
Center for Education and Research of Symbiotic, Safe and Secure System Design	Professor, Graduate School of System Design and Management	Takashi Maeno	2008/07/01～2013/03/31	Yagami/Hiyoshi
Career Development Center -Medical and Life Science-	Professor, School of Medicine	Toshio Suda	2008/07/01～2013/03/31	Shinanomachi
Global Research Center for Science and Technology (SU)	Professor, Graduate School of System Design and Management	Taketoshi Hibiya	2008/07/01～2010/03/31	Hiyoshi
Center for Advanced Light-Wave Control Technologies	Professor, Faculty of Science and Technology	Fumihiko Kannari	2008/08/15～2013/07/14	Yagami
The Twin Research Center for Behavioral Development	Professor, Faculty of Letters	Juko Ando	2008/09/01～2010/03/31	Mita
Global Center for Public Space Information (SU)	Professor, Graduate School of Media and Governance	Ikuyo Kaneko	2008/12/01～2009/11/30	Shonan Fujisawa
Collaborative Innovation Center for Cutting-Edge Life Science Research	Professor, Faculty of Science and Technology	Hiroshi Yanagawa	2009/01/01～2014/03/31	Yagami
Keio-Med Open Access Facility	Professor, School of Medicine	Hideyuki Okano	2009/02/01～2013/03/31	Shinanomachi
Spintronic Research Center	Professor, Faculty of Science and Technology	Kohei Ito	2009/03/01～2012/03/31	Yagami
Nursing Best Practice Center (SU)	Professor, Faculty of Nursing and Medical Care	Yuko Takeda	2009/03/01～2011/02/28	Shinanomachi
Research Centre of Human Cognition (SU)	Professor, Faculty of Letters	Shigeru Watanabe	2009/04/01～2011/03/31	Mita
Global Center for Learning Scinence and Technology (SU)	Professor, Graduate School of Media Design	Keiko Okawa	2009/04/01～2011/03/31	Mita
Center for Energy and Environmentr (SU)	Professor, Faculty of Business and Commerce	Yoko Wake	2009/04/30～2010/03/31	Mita
Negotiation Research Center (SU)	Professor, Faculty of Law	Jiro Tamura	2009/06/01～2011/03/31	Mita

Office of Research Administration

Providing support for the enhancement of research activities

http://www.ora.keio.ac.jp
E-mail: ora-honbu@adst.keio.ac.jp

The Group of Offices of Research Administration, established in 1999, is made up of a head Office function and branch offices established on the Mita, Hiyoshi, Yagami, Shinanomachi, and Shonan Fujisawa Campuses to provide effective research support to researchers affiliated with Keio University. Adding Shin-Kawasaki, Tsuruoka, and Shiba-Kyoritsu Campuses as new members, these eight offices currently cooperate with the Head Office function to realize flexible and appropriate administrative support on specific research projects inside and outside of Keio University, that are becoming increasingly diverse and complex.

1 Supporting the operation of industry-government-academia collaboration projects

In recent years, Keio University has been involved in the planning and acquisition of an increasing number of projects focusing on research and technology seeds sought out from a university-wide perspective, and on the needs of external institutions that seeks innovative partnerships and proposals. The Offices of Research Administration on each campus have been working towards the development of these projects, with the Center for Research Promotion acting as a liaison, to support researchers and contribute to the implementation of high-quality research activities.

[Major research support services]

- Gathering information on research grants, and providing relevant data to researchers
- Acting as liaison with other related organizations inside and outside the university
- Providing support in application processes and reporting procedures
- Assisting in all aspects of project management
  (progress management, research expense management, negotiating and completing various types of contracts, including contracted research.)
- Supporting the publication of research results and various PR activities

2 Supporting the operation of research projects conducted under the leadership of Campuses

Keio University is currently involved in a number of advanced research projects that are conducted under the initiative of the campuses on which these projects are conduted. Perssonel exchange and various forms of research are conducted in each field, through such organizations as the Keio Leading-edge Laboratory of Science and Technology (KLL) at the Yagami Campus; the Center for Integrated Medical Research at the Shinanomachi Campus; the Keio Research Institute at SFC (Shonan Fujisawa Campus), the Shin-Kawasaki Frontier Research and Education Collaborative Square in Kawasaki City, and the Institute for Advanced Biosciences in Tsuruoka City. The Offices of Research Administration on each campus play an important role in actively supporting research activities. Services offered include: Studies of ideal research structures on each campus; mediation, negotiations, and completion of contracts related to joint research and contracted research; hiring procedures for research staff; PR and publishing activities
(introductions of research and researchers, research results, etc.); management of research expenses and facilities; and operation of events.

3 Applications for and management of public research capital, and overseeing subsidy programs within the university

The Head Office of Research Administration, in collaboration with its branch offices , oversees all aspects of large-scale competitive grants and private educational subsidies (special subsidies), including the Global CEO Program, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) Subsidies for scientific research expenses, and the Special Coordination Fund for the Promotion of Science and Technology. The Head Office also takes initiative in "compliance activities," in which education is provided to researchers within the university and to related administrative divisions regarding the appropriate use and management of research expenses by research institutions, an area that has also increasingly become a subject of interest among the Japanese society over the past few years.
Educational activities include study meetings and the publication of manuals on the use of research expenses.
Keio University has also established a number of original grant programs having internal funds and operating expense budgets as financial resources, to enable researchers within the university to utilize these grants effectively in their own research activities. The Head Office of Research Administration is also responsible for supervising the operation of these internal grant programs. Furthermore, it plays a main part in responding to open calls from private sector grant foundations and managing databases of information on researchers.

Examples of guidelines for administrative procedures created by the Office of Research Administration Headquarters "Manual on the Management of Public/External Research Funds" and "Research Handbook"

Research on Modern Politics in Korea and Japan-Korea Joint Research

Recipient of 2008 Fukuzawa Award

Masao Okonogi
Professor, Faculty of Law and Political Science

My research is related to the modern politics of the Korean Peninsula. This research consists of three main areas. The first area is Cold War history and the linking between regional politics and international politics, for example, in the formation of a divided system after the end of WWII and during the Korean War. The second area is the domestic politics of South Korea and North Korea after the entrenchment of the divided system. The third area of research is the conflict between the two systems and reunification. I have taken great pains to think about Korean politics from the perspective of leaders and citizens of both Koreas on the one hand and from the cold and detached perspective of international politics on the other hand.

For example, two papers of mine that have recently been published relate to the first area of research stated above, international political history of the early Cold War period. One paper is entitled "The Geopolitics of setting of the 38 Parallel—Military Operations against Japan and International Politics," which is published in *"Keio Political Science and International Politics,"* a collection of papers from the Faculty of Law and Political Science in commemoration of the 150th anniversary of Keio University. The second paper is entitled "The Korean Independence Problem and the Trusteeship Framework—The Pursuit of 'Joint Action' by the Big Four," which is published in the latest issue (August) of *"Keio Law Review."* One point that has now been totally forgotten is that for 35 years until Japan's defeat in WWII, the Korean Peninsula was a part of the Empire of Japan. Consequently, the liberation and decolonization, the division and occupation by America and the Soviet Union, and the establishment of two nation states are all part of the modern history of Japan.

Another paper relates to the third area of research stated above. The paper is entitled "A Strange Coexistence with Nuclear Weapons—Regional Order in the Korean Peninsula," published in *"East Asia Regional Order and Community Framework,"* which is the final volume of the Collected Papers on Japan-Korea Joint Research. This paper deals square on with the North Korean nuclear problem. In the development of nuclear weapons, each country has its own motives. In the case of the failed state of North Korea, the most distinctive characteristic is how closely its motive relates to the survival of the North Korean system. I argue that without the reform of or the end to the system, North Korea cannot be freed of nuclear weapons. Therefore, what is required is a prescription that is based on this reality.

However, I could not have received the 2008 Fukuzawa Award based solely on the research mentioned above. As the award citation notes, "achievements in research on the politics of the Korean Peninsula and Japan-Korea academic exchange," I have been deeply involved in the promotion of Japan-Korea joint research and exchange, especially in the fields of history and social science. It is impossible to do research on the modern politics of the neighboring Korean Peninsula without considering the realities of Japan and Korea and the state of their relationship. In that sense, regional researchers and international political scientists can take pride in their efforts. Even though researchers are not diplomats, I believe that the existence of borderless networks of researchers can function as a buffer to soften conflict between nations.

The Japan-Korea Joint Research Forum was launched in 1995 based the Murayama statement on wartime history. This Forum with 210 researchers from Japan and South Korea is a joint large-scale research project. Through joint research, I have been able to contribute to the formation of a community of Japan-Korea joint studies. In addition, even though I am only a social scientist, I have been deeply involved in the launch of the national Japan-Korea History Joint Research project, serving as a committee member in the first stage. Finally, I am serving as Japanese representative of the "Japan-Korea New Era Joint Research Project" currently in progress under an agreement between government leaders in Japan and South Korea.

The complete "Collected Papers on Japan-Korea Joint Research" in 21 volumes

Innovations in Early Life Course Transitions

An international collaborative research project funded by the U.S. National Institutes of Health (NIH)

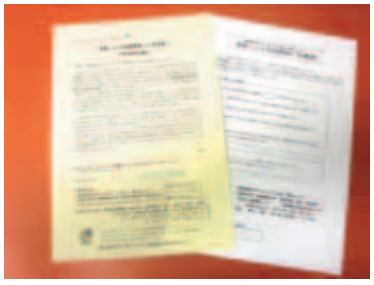
Noriko Tsuya
Professor, Faculty of Economics

This international collaborative research project seeks to account for the trends, patterns, and factors associated with dramatic changes in Japanese family behaviors and attitudes, such as marriage and childbearing, employment, and gender relations at home, based on data drawn from large-scale national surveys. These behavioral and attitudinal changes are the primary forces underlying Japan's rapid aging and fertility declines to below-replacement levels. They are also the main factors of the country's population decline which is projected to accelerate during the first half of the 21st century. These family changes have been brought about, at least in part, by such macro social-structural changes as economic growth, industrialization, and urbanization that Japan has experienced after World War II, and similar socioeconomic changes have occurred in almost all Western countries and many other industrialized economies in Asia. With cultural heritage distinctively different from that of the West, Japan is the first non-Western country to enter the post-industrial stage of industrial development. As such, the country provides an important case study, offering insights into the current experiences and future prospects of family changes in other parts of Asia and beyond.

To empirically examine these behavioral and attitudinal changes in the Japanese family, the project conducts two types of national survey in 2009: a follow-up of the 2000 national survey on family and economic conditions, and a cross-sectional survey based on a newly-drawn sample. The former survey is a follow-up of the respondents of the National Survey of Family and Economic Conditions (referred to as the NSFEC), conducted in 2000 as part of the "Asian Financial Crisis and Macro Economic Policy Response," a grant-in-aid for COE research supported by Ministry of Education, Culture, Sports, Science and Technology. The 2000 survey was based on a national two-stage stratified probability sample of Japanese men and women aged 20-49 of all marital statuses. The sampling units were randomly chosen based on the census tracts distributions of the Japanese population by gender, age, and place of residence. A total of 4,482 persons (2,102 men and 2,380 women) were successfully surveyed. The follow-up under discussion is the first attempt to trace all the respondents of the 2000 survey. Of all the 2000 survey respondents, 32 had either died or refused to participate, resulting in 4,450 persons as the target sample size for the follow-up.

The field work for this second round of the NSFEC was conducted from May to June in 2009 by the Shin Joho Center, the survey agency that carried out the field work of the NSFEC in 2000. Although there were a considerable number of respondents whose contact addresses were not updated or lost because a long time (9 years) had elapsed since the 2000 survey, we successfully obtained 2,330 usable questionnaires.

This project also plans to conduct a new nationwide cross-sectional survey in October to November 2009. Like the 2000 survey, this new survey will also be a national, two-stage stratified probability sample of Japanese men and women aged 20-49 of all marital statuses, based on the population distributions by gender, age, and place of residence obtained from the census. Using the same questionnaire as the one used for the follow-up discussed above, we plan to contact approximately 6,000 persons. While the objective of the follow-up survey was to collect information on changes in behavior and attitudes of same individual men and women, this new cross-sectional survey aims to obtain nationally representative data on work and family life to examine the national trends in Japanese family behavior and attitudes through comparison with the results from the 2000 survey. Using micro-data drawn from these surveys, we plan to conduct various statistical analyses, based on both descriptive and multivariate models.



Questionnaire of the second round of the National Survey of Family and Economic Conditions

Environmental Activities in Shenyang and Chengdu

FY2008
Keio University 150th Anniversary Commemorative "Design the Future Fund"
Interdisciplinary Environment Project

Hikaru Sakuramoto
Professor, Faculty of Business and Commerce

In the developing countries of East Asia, environmental pollution and land degradation are becoming worse. In Japan, the population is decreasing and the country is facing natural blight. If conditions remain as they are, human survival will become threatened and development will not be sustainable. Based on a framework both international and national, this research combines the principal activities of environmental businesses and citizens of Japan and China. It aims to establish an environmental conservation and regional regeneration framework through international policy coordination among communities. Long-term practice centers have been implemented in Shenyang City, Liaoning Province in the Northeast interior and in Chengdu City, Sichuan Province. These centers have simultaneously carried out research and conducted experiments.

The Project cooperates on a CDM (clean development mechanism) tree-planting project in Shenyang and transplant experiments for the edible bamboo of pandas in Chengdu. Up to now there have been a number of symposiums held in Tokyo, Beijing, Shenyang, and Chengdu. Every effort is made to announce research progress and achievements.

Looking ahead, efforts will be made to strengthen human resource training in both Japan and in the field, to expand the research organization, to create a framework of environmental policy coordination, and to further advance demonstration experiments.

This Project was launched in 1985. Under the leadership of Professor Emeriti Yoshikazu Hashimoto and Tatsuo Yamada, air pollution in East Asia was measured, a related network was created, and an environmental research framework was discussed. In 1990, the Center for Area Studies became home to the Research Center for the Chinese Environment (directed by Tatsuo Yamada (1990-1993), by Tomoyuki Kojima (1994-2007), and by Hikaru Sakuramoto (from 2008)). The Center conducts research related to air pollution, epidemiology, industry, legal systems, political policy, and development. With a focus on the regions of Chengdu and Shenyang, the Center has been working on general joint environmental research from its launch to the present day.

Some years back, under a Keio University Special Grant-in-Aid for Innovative Collaborative Research Projects (1996-1998, Professor Yoko Wake, Faculty of Business and Commerce), the Project implemented an "environmental model district" for achieving sustainable development in Chinese cities and promoted its practice. Environmental model districts are still being implemented today.

For the Mirai-Kaitaku Project—Asia's Economic Development and Environmental Conservation (1998-2001, Professor Kanji Yoshioka, Institute of Economic and Industrial Studies), the Project participated in "Environmental Conservation of the Asian Region" under the "JSPS Research of the Future Program." This activity involved joint environmental research and the implementation of specific programs. In addition, the Project has participated in multi-tiered activities to improve the environment in Shenyang and Chengdu; for example, by introducing a bio-briquette plant (to reduce SO2) and by reducing alkaline soil salinization. In Kangping County, Shenyang City, the Project has participated in tree-planting, a 100-meter-wide belt stretching 100 kilometers called the "China-Japan Friendship Forest." In Chengdu, the Project has been active in transplant experiments on the edible bamboo of pandas. And it has supported food aid and tuberculosis treatment in North Korea.

From 2002 to 2007, the Project participated in the "Policy Innovation Initiative: Human Security Research in Japan and Asia" (a MEXT 21st Century COE Program) under the leadership of Professor Tomoyuki Kojima of the Faculty of Policy Management. Activities included policy research and practice, commercialization proposals for small-scale CDM afforestation and reforestation and transplantation of edible bamboo for pandas.

The "Interdisciplinary Chinese Environment Project" from 2007 to 2009 has been selected by the Keio University 150th Anniversary Commemorative "Design the Future Fund." Activities include visits to Shenyang each summer, the promotion of joint research based on Japanese-Chinese research teams (including many undergraduate and graduate students from Keio). Mixed teams of Japanese and Chinese students are formed to deepen understanding of joint research and to work together on global environmental themes. Through these teams, students experience the "spirit of practical science" and the meaning of international exchange

The Project is currently making every effort to have the "Japan-China Friendship Forest" recognized as a small-scale CDM afforestation project by the CDM Executive Board at the United Nations. If approved, it will be the first such project in Japan as set forth in the Kyoto Protocol.

Tree-planting in Kangping County

Linking the Body, Mind, and Language

FY2008
Keio University 150th Anniversary Commemorative "Design the Future Fund"
Thinking about Voice Project

Chiaki Yokoyama
Professor of Faculty of Law and Director of Keio Research Center for the Liberal Arts

You know, when we communicate with each other, except in the written form of "language," we use our voice and body language without realizing it. In the same way, activities like acquiring knowledge, understanding, and communicating are all performed via the body. The "body" means not only the physical body, but the mind and emotions that exist inside. The background to recent lively discussions on this kind of body might come from a sense of danger that surrounds people in the current age. That is, an air of crisis related to the body that feels empty in the wave of technology and a mind, feelings, and insecurity that cannot be controlled rationally.

Lately, a reflection of the current situation can been seen in various discussions about phrases such as "theory of the body" and "mind-body" with their concepts having gone beyond philosophical and aesthetic meanings. These discussions show that what is demanded in the real world is education not limited to the classroom lecture.

Logical thinking capacity and sensitivity transform into true understanding and intelligence when they go hand-in-hand with the body. "Getting it" is a phrase that aptly expresses this kind of understanding. That is why diverse fields such as brain science and cognitive science, the arts and clinical psychology, and contemporary thought are all promoting research and education related to the body. However, in reality there are very few places for mutual research exchange between different academic fields.

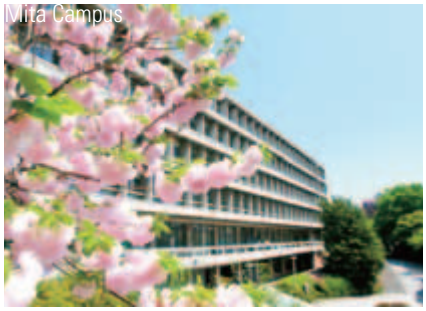
The "Mind and Body Project," which belongs to Core Research of the Keio Research Center for the Liberal Arts, is a research program launched in response to these conditions. In this Project, researchers of different academic fields discuss various theories concerning the mind and body. Findings from these discussions are verified through the research and practice of experimental classes. The "Thinking about Voice Project" covers the practical part of this Project. This "Voice Project" has been active as a Design the Future Fund program since 2007.

One application is the experimental class "New Literature Education." Using literature as it is discussed based on letters, this class is being developed to stimulate individual interpretations through different modes of expression (e.g. recital, drama, dance, collage, music). Then through re-creations to verbalize those interpretations, the class tries to build linkage between language, society, and the mind and body. Thus far the class has discussed *Lady Chatterley's Lover* by D.H. Lawrence, *A Dream of John Ball* by William Morris, and *The Lives of Animals* and *Disgrace* by J.M. Coetzee.

In addition to the original content, what distinguishes the class is the team of teachers and the students who enroll. Teachers of different specialties at Keio University work together with professionals (e.g. stage directors, modern dancers, actors, musicians, readers, athletes) to construct a new course that links with the outside of university. Great results were achieved in an intensive class held for one week during the summer break with participation from students from the workforce enrolled in the Faculty of Correspondence Courses. Undergrads, correspondence course students, and teachers gathered together as participants. This made the summer intensive course an excellent opportunity for teachers to search for new literary interpretations and educational methods.

Recently, the research of the "Body and Mind Project" and the practice of the "Voice Project" at Keio Research Center for Liberal Arts have also received high praise from outside parties. Looking ahead, the Center wants to see even more people participate in the Projects. Through the feedback of participants, the Center aims to build new knowledge models that can be sent out to the world.

2008 "New Literature Education" experimental class


Mita Campus

Research Centers

Mita Campus

Pathways to the Future for the Humanities, Social Sciences, and Natural Sciences: Centers for Comprehensive Research and Education

For Inquiries:

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The Mita Campus is home to undergraduate departments (primarily for third-and fourth-year students), six graduate schools, and independent research institutions. Here, we will introduce the recent status of activities at research facilities on the Mita Campus.

Research Institute for Digital Media and Content (DMC Institute) http://www.dmc.keio.ac.jp/en/

The Research Institute for Digital Media and Content (DMC Institute) seeks to create and circulate knowledge by pursuing research that consider digital contents from a variety of perspectives, including content design, media technology, intellectual property management, and industry policy.
The Institute also makes efforts to transmit the results of research; for example, in March 2009, it held an international symposium entitled "Designing The Global Creative Society." It also pursues the potential of next-generation contents using high-definition video through demonstrative experiments and joint research with companies and other universities.


At the symposium

Global Security Research Institute (G-SEC) http://www.gsec.keio.ac.jp/index_e.html

The Global Security Research Institute (G-SEC) carries out research on the broad field of global security with an emphasis on "watching and warning." In other words, we constantly keep watch on problems in various fields and transmit necessary warnings. With this consciousness, we participate in industry-government-academia collaborations with an eye toward providing policy advice and creating objective evaluations, while at the same time carrying out our research activities. Our goal is to contribute to the sustained development of society. In FY2008, we expanded and deepened interfaces with society through our research. For communicating common points in the Institute's wide range of research areas, we 1) started "Watch and Warning" seminars, 2) sponsored the annual G-SEC conference, and 3) began publishing the G-SEC Newsletter. We also conducted numerous projects in a various fields, including Medicine and the Humanities / Social Sciences.


2nd Annual G-SEC Conference

Research Center for the Arts and Arts Administration http://www.art-c.keio.ac.jp/en/

The Research Center for the Arts and Arts Administration at Keio University pursues researches in areas including the fine arts, architecture, music, literature, theater, cinema, and dance, as well as their cultural appreciation in contemporary society from a holistic and academic stance. In cooperation with experts, the Center develops and carries out domain-transcending activities such as seminars, lectures, exhibitions, performances, workshops, case studies for art management, and construction of art archives.
Events in 2008 included a Butoh performance by Ko Murobushi entitled "quick silver / HIYOSHI version"; an exhibition entitled "The User's Domain"; an exhibition of prints as part of Minato Ward contract business; and concerts, as well as a donated course by the Recording Industry Association of Japan entitled "Creative Industry Research." The Research Center held a report meeting for the final year of Ministry of Education, Culture, Sports, Science and Technology (MEXT) ORC operations, and issued a printed version of the report. The results of research are also published and disclosed in the Center's *Annual Report* and in "*ARTLET*" and "*BOOKLET*."

Publications: "*Annual Report* (2007/08)" No. 15; "*ARTLET*" No. 30 & 31; "*BOOKLET*" No. 17


"The User's Domain": Hanga woodblock prints, photos, and multiple works from the past and present (December 3-13, 2008)

Center for Japanese Studies http://www.ic.keio.ac.jp/nncenter/

The Center for Japanese Studies offers Japanese language and Japanese studies courses to international students. In addition, research on various topics related to second-language education is carried out, in addition to the education and training of next generation Japanese language teachers.

The Center for Japanese Studies promotes education in Japanese language and culture. It provides Japanese classes for first-and second-year students enrolled at the Hiyoshi campus and international students belonging to the Graduate School of Science and Technology, as well as for 193 international students from 30 countries enrolled in the Japanese Language Program. In addition to Japanese language classes, the Center also runs Japanese language education courses to foster Japanese language instructors.
In the 2008 academic year, the Center published *Nihongo to Nihongo Kyoiku* No. 37 (Japanese and Japanese Language Education, March 31, 2009, ISSN 0286-5742).


"Japanese Language and Japanese Language Education" Journal No. 37

The Keio Institute of East Asian Studies (KIEAS) http://www.kieas.keio.ac.jp/english/index.html

At the start of the 2007-08 year, the Keio Institute of East Asian Studies (KIEAS) established the Center for Contemporary China Studies, and at the end of the 2008-2009 year, it established the Center for Contemporary Korea Studies (Director: Masao Okonogi). An opening ceremony for the new Center was held in February 2009 along with a commemorative symposium, welcoming many participants from inside and outside of Keio University, including President Yuichiro Anzai. KIEAS has also held numerous study meetings, including some by KIEAS Fellows, as well as joint symposiums and workshops with Princeton University, University of Toronto, the North Pacific Region Advanced Research Center (Sapporo), the Asan Research Institute (Seoul), Korea University (Seoul), and Chung-Aug University (Seoul). It also held "KIEAS Lectures" by 14 instructors on the theme of "Popular Culture and Festival Space in East Asia."


Commemorative symposium marking the opening of the Center for Contemporary Korea Studies (February 5, 2009)

Fukuzawa Memorial Center for Modern Japanese Studies http://www.fmc.keio.ac.jp/fmc/eng.html

In 2008, the Fukuzawa Memorial Center for Modern Japanese Studies opened a new course at the Hiyoshi campus, to add to the six courses at the Mita campus. The Center also held a commemorative lecture in May and a commemorative workshop in December to celebrate its 25th anniversary. As part of Keio University's 150th anniversary events, the Center published the "*The Keio Encyclopedia*" before the anniversary celebration in November, and hosted the "Exhibition celebrating the 120th anniversary of the birth of Shinzo Koizumi" (Library; old large meeting room) in May and handled the planning, display, and catalog of the "Fukuzawa Yukichi: Living the Future" exhibit held from January to March at the Tokyo National Museum.

Publications: "*Bulletin of Modern Japanese Studies*" No. 25 (2008); "*Newsletter of Fukuzawa Memorial Center for Modern Japanese Studies, Keio University*" No. 9 & 10; "*The final battle between Waseda and Keio; late autumn of 1943*" (Kyoiku Hyoron Sha Co.,Ltd.; Nov. 2008; jointly edited by the Waseda University Archives and the Fukuzawa Memorial Center for Modern Japanese Studies, Keio University)

Lecture meeting commemorating the Center's 25th anniversary (May 2008)

Teacher Training Center http://www.ttc.keio.ac.jp/

The Teacher Training Center, established in December 1982 as a university-wide organization for training instructors, has turned out many outstanding teachers.
In 2008, using the "Teacher Logbook" developed through the Ministry of Education, Culture, Sports, Science and Technology (MEXT) Teacher Training "Good Practice" Project, the Center identified and worked to correct problems related to the Logbook's functions. One of the results of these efforts is enhanced management functions aimed at sharing information on academic guidance. The Teacher Logbook can now be used by graduates, part-time instructors, and instructors handling multiple courses.
Lecture meetings established in past years, including "Speaking with young teachers" and "Dialog with Society and others," were also held in 2008.
In front-line education, the Teacher Training Center was responsible for "Tokyo 10-year Training" in the summer, and for teachers' university courses in Minato Ward.
The Teacher Training Center's *Annual Report* (No. 19) was issued as a regular publication.

International Center http://www.ic.keio.ac.jp/en/index.html

The International Center is at the core of Keio University's international activities. It is responsible for sending numerous students and scholars abroad every year, as well as welcoming those coming to the University. The Center provides support to international students on both academic and lifestyle matters, and is also in charge of exchange programs and overseas short-term research programs. For that purpose, it holds overseas study fairs and information sessions on studying abroad in general, and also provides information on exchange programs. There are also International Studies and Japanese Studies courses in which both overseas and Japanese students can study subjects such as the culture, history, politics, and economics of Japan and other countries in English, to promote mutual understanding of different cultures.
In addition to regular courses, the International Center provides support for international symposiums and various other events. Among the events held during FY2008 was a summer program at the Mita Campus in collaboration with Bocconi University in Milan, Italy.

Shido Bunko, Institute of Oriental Classics http://www.sido.keio.ac.jp/

The Institute of Oriental Classics or *"Shido Bunko"* is an affiliate institute with a Director, six full-time instructors, and four part-time instructors (two from Keio University and two from outside the University). Its mission is to conduct bibliographical research related to Japanese and Chinese literature. During the FY2008, it welcomed Chen Zhenghong as a visiting professor from the Classics Research Laboratory at Fudan University in Shanghai, China. Prof. Chen gave a presentation at the 22nd *Shido Bunko* Lecture Meeting entitled "The Significance of Chinese Texts in Vietnam as part of Publishing Culture in East Asia: Looking at books stored in the Keio University Library and the Tohoku University Library."

Publications in 2008 included "*Bulletin of the Shido Bunko Institute*" No. 43 (February 28, 2009) and "*Kokin-shu Chushakusho Eiinsokan* 1, 2, and 5-8" (Bensey Publishing Co.; November-December 2008; editing supervised by *Shido Bunko*).

Small exhibition at the 22nd Shido Bunko Lecture Meeting

Keio Economic Observatory http://www.sanken.keio.ac.jp/index_e.html

The Keio Economic Observatory (KEO) was set up as an affiliated institute in 1959, as part of the commemoration of the 100th anniversary of the founding of Keio University. Since then, it has conducted academic researches in the three fields of Economics, Law, and Behavioral Science. The membership consists of full-time members of the Institute, members from related Faculties, and co-researchers from Japan and overseas. Projects include the construction and analysis of databases on subjects such as input-output analysis, the environment, and Flow of Funds analysis; the oral history of industrial relations; and a proposal for applying the Antitrust Law to public utilities. The Institute is also conducting empirical research into various projects such as an environmental assessment of solar powered satellites (SPS) and an aforestation clean development mechanism (A/R CDM) project. From FY2007, the Institute initiated a project relating to productivity in Asian countries and held an international symposium relating to the measurement of productivity.

Publications this year included *the Library of Keio University Sangyo Kenkyujo* and *Keio Economic Observatory Discussion Papers*.

Special lecture by Professor Dale W. Jorgenson (January 15, 2009)

Institute for Media and Communications Research http://www.mediacom.keio.ac.jp/english/about.html

This year, the Institute for Media and Communications Research conducted six research projects using research funds, special contributions, and educational promotion capital from other sources. The results of research were published in a journal outline and an independent volume.

Published research included:
Keio Media and Communications Research No. 59 (March 2009)
Keio Communication Review No. 31 (March 2009)
Video Content Industry and Film Policy; Ed.: Minoru Sugaya, Kiyoshi Nakamura, Takashi Uchiyama; Maruzen Co., Ltd. (Jan. 2009)
Cultural Migrants: Young Japanese and Transnational Media
Yuko Fujita; Shin-Yo-Sha (Sept. 2008)

Partial list of research results

Institute of Cultural and Linguistic Studies http://www.icl.keio.ac.jp/

The Institute of Cultural and Linguistic Studies has full-time staff and conducts basic researches on subjects such as the various languages, cultures, and philosophies around the world, and on linguistics and linguistic theory. The Institute promotes a wide range of research projects together with scholars both from within Keio and outside. In FY2008, it issued REPORT of *The Keio Institute of Cultural and Linguistic Studies* No. 40 (March 2009) .
The Institute also invites eminent scholars from Japan and overseas to a wide range of international conferences, symposia and lecture meetings, such as the Tokyo Conference on Psycholinguistics (TCP), linguistics colloquia (three times a year), an Islam lecture meeting, and two courses that are open to the public. The TCP report was published as a collection of research papers in English. In addition, the Institute has set up special courses relating to languages that are not offered by any academic department (23 courses on 11 languages).

Publications: REPORT of *The Keio Institute of Cultural and Linguistic Studies* No. 40

Research Centers

Hiyoshi Campus

Research and Education Centers Open to the Neighborhood, Aiming for Collaboration with Society and the Local Community

For Inquiries:

Hiyoshi Campus
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Yokohama-shi,
Kanagawa, 223-8521 Japan
TEL: +81-45-566-1000

The Hiyoshi Campus houses seven faculties (Letters, Economics, Law, Business and Commerce, Science and Technology, Medicine, and Pharmacy) for first and second year students; three graduate schools (Keio Business School (KBS), System Design and Management (SDM), and Keio Media Design (KMD)); and six research institutes.

Graduate School of System Design and Management (SDM) http://www.sdm.keio.ac.jp/

The Graduate School of System Design and Management conducted lectures endowed by the Norinchukin Bank and the Nihon Keizai Shimbun and held the symposium "The Challenge of Living with the Environment through Next-Generation Systems." Externally-funded projects totaled 23 of which three were based on public funds, 15 on private funds, three on grants-in-aid for scientific research *(Kakenhi)*, one on *Kakenhi* contribution arrangement, and one on a NEDO contribution. These projects conducted research on advanced manufacturing system support, robust design for next-generation systems, safe system management, visualization in immersive dome environment, and ground-to-train communication system using free-space optics technology. SDM cooperates with the Graduate School of Science and Technology on the Global COE Program "Center for Education and Research of Symbiotic, Safe and Secure System Design." The Center has produced 35 original papers, delivered 76 oral presentations at academic meetings, and received a total of 20 copyrights, patents, and awards.

Train communication experiment using optical space waves

Graduate School of Media Design (KMD) http://www.kmd.keio.ac.jp/

The Graduate School of Media Design (KMD) was established in April 2008 to advance integrated research and education in the fields of digital media, content, and design. With a focus on creativity, KMD is an advanced interdisciplinary education program open to the world for the development of "media innovators" who can become leaders on the international stage. With a home at the Kyosei-kan on the Hiyoshi Campus, KMD'S 13 faculty members and two research members engage in research and education activities with 91 students, including 19 exchange students.
In KMD's first year, several research achievements by newly admitted students were selected by top-level international conferences such as those hosted by ACM SIGGRAPH and others. In March, KMD hosted the student-led video event "Future Motion 2009." Students and faculty are working together to positively develop research and education activities at KMD.

Future Motion 2009

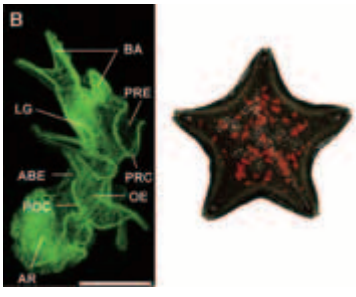
Graduate School of Business Administration (KBS) http://www.kbs.keio.ac.jp/

KBS held a symposium on "Restoring the International Competitiveness of Japanese Firms—Seeking a New Way of Corporate Management under a Financial Crisis." Under the themes of solving the problem of cutthroat competition and strengthening overseas investment, the aim of the symposium was to search for measures to recover the international competitiveness of Japanese companies from the viewpoint of business structural reform.
Together with researchers from Tsinghua University (China) and KAIST (South Korea), KBS also held a workshop at the Kyosei-kan on business issues, prospects, and the way of management in Asia. With participants from the top business schools in China, Korea, and Japan, this workshop marked the inaugural meeting on joint research. A second meeting is planned to be held in Beijing, China.

East Asia business school workshop

Research and Education Center for Natural Sciences http://www.sci.keio.ac.jp/

The Research and Education Center for Natural Sciences was launched on the Hiyoshi Campus on April 1, 2009. The Center advances research and education activities in natural sciences in a broad sense. The Center plans to promote projects of various contents and scales, from cutting-edge academic research to research and education activities in cooperation with combined schools, irrespective of the faculty or the area of specialty. On November 20, 2009, the Center will host a symposium at the Raiosha facility.



Overview of starfish larva's nervous system (left) and adult starfish (right)

A Place to Interact and Work Together with Society on "Knowledge"

Hiyoshi Campus has been steadily unfurling research activities in a wide range of disciplines—including the humanities, the social sciences, and the natural sciences—with the aim of introducing its achievements to parties within and without the university and returning the fruits of those achievements back to society. To fulfill that aim, Hiyoshi Campus has held the Hiyoshi Research Portfolio (HRP) since 2005. In 2008, Hiyoshi Campus held a poster panel exhibit of research achievements, various symposiums, lecture meetings, and special exhibitions to commemorate the 150th anniversary of Keio University.
http://campus.hc.keio.ac.jp/ora/HRP/

Raiosha meeting place

The Keio Research Center for the Liberal Arts http://www.hc.keio.ac.jp/lib-arts/en/index.html

The Keio Research Center for the Liberal Arts was founded in July 2002 to search for the ideal systems that liberal arts education should adopt through multifaceted investigations and researches conducted in Japan and overseas, planning and making proposals for specific programs, and at the same time validating the effectiveness of those proposals through experiments.
The approximately 200 members, from a wide range of educational organizations from integrated high schools to various campuses and institutes of the univeristy, have been actively conducting research.
In FY2008, the Center promoted "Core Research" in two areas ("Keio University Educational Curriculum Research" and "Body and Mind Project"), "Specialized Research" centered on "Hyper Representation Digital Research" under the "Academic Frontier" category of the "Promotional Project for Advancement of Academic Research at Private Universities, and "Individual Research" that supports the researches by individual members of the Center. The Center has been establishing partnerships with research facilities and scholars within and without Keio University to expand research network in liberal arts. It has also offered experimental courses, lectures, and seminars, together with publishing and validating research results both in print and databases.


Academic Skills Presentation Competition

Periodicals issued by the Center include: *Annual Research Reports, Newsletters, Symposium Reports, CLA Archives, Activity Reports,* and *Liberal Arts Research Center Library.*

Keio Research Center for Foreign Language Education http://www.flang.keio.ac.jp/

The Keio Research Center for Foreign Language Education was founded in October 2003. One of the Center's primary missions is to consider foreign language education across all Keio affiliated schools. The Center has a total of approximately 100 members covering the range from elementary school to graduate school, and is driving forward with its research activities.
The Center was selected as a center for the Academic Frontier Program for Promoting Research Excellence at Private Universities for its "Action Oriented Plurilingual Language Learning (AOP) Project." This project is expanding research that gains a comprehensive understanding of all study stages from primary school to graduate school and increases the consistency of foreign language study, centered on English-language education, and also focuses on the challenge of enhancing plurilingual and pluricultural capabilities in communications. (http://www.aop.flang.keio.ac.jp/)

Periodicals: *Journal of Foreign Language Education, Annual Research Report,* and *Keio Research Center for Foreign Language Education Symposium.*


Foreign Language Lounge

Health Center http://www.hcc.keio.ac.jp/

The field of Health Center's research is divided into physical and mental health. The Center is conducting researches on hypertension, diabetes, metabolic syndrome, obesity and other lifestyle-related diseases, as well as anorexia nervosa, cardiac diseases, liver diseases, infectious diseases, respiratory diseases, and mental disorders.
The Center is collaborating internationally on research into hypertension, strokes, and metabolic syndrome, and has published papers on that research.
The Center published 47 papers written in English between 1972 and 1994, and 214 papers between 1995 and 2008. Members of the Center have also made presentations at international conferences such as those held by the International Society of Hypertension and the American Diabetes Association.
The Center publishes *the Bulletin of Keio University Health Center* and *the Annual Report of Keio University Health Center* once a year.


Health Center (Hiyoshi)

Sports Medicine Research Center http://www.hc.keio.ac.jp/sports/

The Sports Medicine Research Center covers a broad range of activities. In addition to improving the competitive performance and strength of athletes, the Center is active in maintaining and enhancing the health of the general public and in preventing and treating diseases (e.g. obesity, lifestyle-related disease).
From FY2007, the Center has held open lectures on "Sports and Health" in partnership with the Graduate School of Health Management for the purpose of presenting evidence-based information to the local community in an easy-to-understand format. In FY2008, the Center simultaneously held an open lecture on "The Secret to Maintaining Sports Activity for Health" and a "Nordic Walking" event. The Center also worked with the Keio University Athletic League on the "Sakura Sports Festival," a joint project with the local community. In the area of research, a three-year intervention study is underway on improving the lives of people suffering from metabolic syndrome. With other research as well, the Center reports its results at local and international conferences on sports and lifestyle-related disease.


Exercise ECG

Institute of Physical Education http://www.hc.keio.ac.jp/ipe/

Since its foundation in 1961, the Institute of Physical Education has promoted the importance of health and sports to Keio University students and teaching staff, and also local residents, through physical education courses within the university, symposiums, and open courses. At the same time, the Institute has implemented a wide range of research related to physical education, health, and sports. In June 2008, the New Building Completion Commemorative Forum of the Institute of Physical Education was held under the Keio University 150th Commemorative Project. Symposium I emphasized research while Symposium II emphasized education. The topic of Symposium I was "Thinking about the Future of Health and Sports Science at Todai, Kyodai, Waseda, and Keio." Representatives from The University of Tokyo, Kyoto University, Waseda University, and Keio University exchanged information on the future direction of sports science.

Periodicals: *Bulletin of the Institute of Physical Education* and *Activity Report of the Institute of Physical Education.*


New Building Completion Commemorative Forum


Yagami Campus

Research Centers

Yagami Campus

Aspiring and Working for the Next Frontiers of Science and Technology

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Faculty/Graduate School of Science and Technology

The Faculty and Graduate School of Science and Technology are located at the Yagami Campus, where research and education centered on scientific and technological fields are conducted.
Approximately 1,800 Master's and Doctoral students in the Graduate school are pursuing their studies and research, together with third and fourth-year undergraduate students. In response to the incredible advances and diversity of science and technology today, the Graduate School of Science and Technology established three schools in the year 2000 that deliberately promote a interdisciplinary approach: the School of Fundamental Science and Technology, the School of Integrated Design Engineering, and the School of Science for Open and Environmental Systems.
In accordance with the principle of pursuing "emerging" themes, work on the campus will continue to be more open and multifaceted, in the form of joint studies into various issues in as-yet unknown interdisciplinary areas that go beyond conventional fields of specialization. Our mission is to foster human resources, as members of society who not only study the leading edge, but also open it up for themselves and become leaders of society.
Specifically, we are seeking to achieve these ends by promoting joint Industry, Government, and Academia Projects through the Keio Leading-edge Laboratory of Science and Technology (KLL). http://www2.st.keio.ac.jp/english/

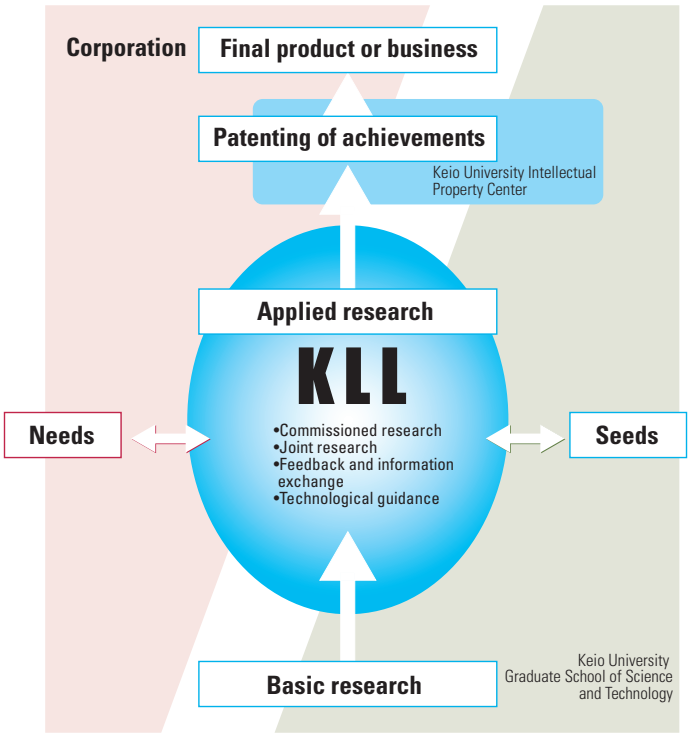
Keio Leading-edge Laboratory of Science and Technology (KLL)

The Keio Leading-edge Laboratory of Science and Technology (KLL) was established within the Graduate School of Science and Technology in 2000 as a center for leading academic research and new business creation, and to act as a stage for collaboration between industry, government, and academia. As a point of contact for research partnerships, the KLL promotes dynamic research partnerships that draw on the originality and internationality of Keio University, as well as its strength as a multidiscipline university. To that end, the KLL coordinates joint research and commissioned research projects and also provides detailed support relating to research agreements, and provides a forum for networking with the industrial world in order to promote the return of research achievements to society.
The KLL also has an important mission and is positioned to create new research fields and foster outstanding scholars, and so it works to encourage nascent research and bearers of the future. By providing KLL Specified Research Projects intended for young or newly-appointed scholars and research grant programs intended for doctoral program students, the KLL provides a system of support from both the research funding and environmental viewpoints that is both proactive and carefully planned.

Research Coordination (Liaison Function)

The KLL acts as a point of contact between Keio University and groups outside of Keio University such as industrial circles, promoting cooperation for research work in the prepatent, or nascent, stage. By introducing the research activities of the Yagami Campus from various viewpoints and responding flexibly to individual concerns, the KLL creates an interactive flow between corporations and university research activities. Utilization of these dynamics enables the KLL to coordinate optimal joint and commissioned research projects, whether within Japan or internationally.

Features of Corporate/University Partnerships under KLL



To Play a Leading Role in Society

Fostering of nascent research and researchers

Every year, the KLL calls for "KLL Specified Research Projects" with the objective of focusing on the development of nascent research fields that are considered to be important to society in the future, to create new research fields and encourage the fostering of leaders in those fields.

The KLL also provides research grants to master's and doctoral program students, with the objective of fostering outstanding scholars in the fields of science and technology. In FY2008, the KLL extended grants of ¥300,000 to each of 135 students in doctoral programs. It has also set up a system to assist with partial travel expenses to students in master's programs, to enable them to present their research at international academic conferences.

KLL Specified Research Projects Selected in FY2008 (Examples)

"A Research on Closed-Loop Supply Chain Management System"
Cao De-bi, Professor, School of Science for Open and Environmental Systems

"Development of Cryogenic Micromachining Technique of the Substrate Material for Microfluidic chip"
Yasuhiro Kakinuma, Assistant Professor, School of Integrated Design Engineering

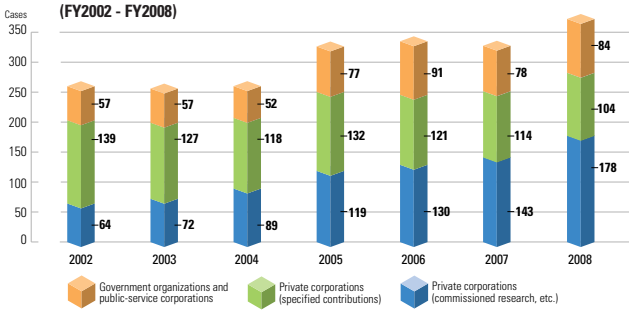
"Studies on the mechanism of ER stress-induced cellular response by Chemical-system-biology approach"
Etsu Tashiro, Assistant Professor, School of Fundamental Science and Technology

Promotion of Joint Industry, Government, and Academia Projects

Through its liaison and other activities, the KLL provides research contract support for suitably matched research themes as well as publicly proposed issues that are accepted. The first consideration is how contracts would facilitate the pursuit of research in an environment that is advantageous to both the sponsoring companies and researchers. Going beyond routine contractual matters, the KLL seeks to provide a comprehensive collaborative research-related service including consultation regarding research space.

The KLL also actively promotes the adoption of public funding by gathering and publicizing information on funding sources such as public subscriptions for competitive research funds from government and research grants from public utility foundations, and not just private funding. It also provides, with a support of Office of Research Administration at Yagami, an environment in which researchers can be reassured about the utilization of research funding after such adoption, in response to research funding management and account audit.

Numbers of Commissioned Research Projects and Other Cases Received (FY2002 - FY2008)



Commissioned Research Projects (Examples)

"A Study on Inter-chip Communication by Inductive-coupling Channel"
Japan Science and Technology Agency
Tadahiro Kuroda, Professor, School of Integrated Design Engineering

"Active Optical Access System with Silicon Photonic Integrated Circuit Project"
National Institute of Information and Communications Technology
Naoaki Yamanaka, Professor, School of Science for Open and Environmental Systems

"The Photon Frontier Network Program (Advanced Light-Wave Control Technologies)"
Ministry of Education, Culture, Sports, Science and Technology
Fumihiko Kannari, Professor, School of Integrated Design Engineering

"Research and Development of Polymer Electrolyte Fuel Cell Systems Research and Development of Polymer Electrolyte Fuel Cell - Multi-points and Real-time Measurements of Water-content in PEM and Current through the use of small NMR Coils"
New Energy and Industrial Technology Development Organization
Kuniyasu Ogawa, Associate Professor, School of Science for Open and Environmental Systems

Returning of Research Achievements to Society

The KLL holds the Science and Technology Exhibition (Keio Techno-Mall) every December to inform the public about the Faculty and Graduate School of Science and Technology's research achievements and to attract corporate interest in collaborative projects. The exhibition emphasizes demonstrations and hands-on exhibits that visitors can actually see and touch.
Dedicated to the theme "Innovative frontiers dreams" the 9th exhibit in 2008 drew over 1,200 visitors. The exhibition featured 70 booths covering a wide range of research achievements, while hosting roundtable discussions on three themes—Ecological Technology, Inter-faculty Collaboration with Medical and Science & Technology, and New Technologies for Fluid Dynamics and Chemical Reactions—and organizing 14 seminars on different collaborative technologies. Commemorating the 10th anniversary of the KLL, the 2009 exhibition, whose theme is "Shaping the Future with Science", is scheduled for December 11 in Halls B7 and B5 of the Tokyo International Forum in Yurakucho.


Scene at the Keio Techno-Mall 2008 exhibition


Demonstration at a booth at the Keio Techno-Mall 2008


Shinanomachi Campus

Research Centers

Shinanomachi Campus

Center for Translational Research ~ from Bench to Bed ~

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Keio University Medical Science Fund
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http://www.ms-fund.keio.ac.jp/index_jp.htm
E-mail:k-msf@adst.keio.ac.jp

The Shinanomachi campus brings together medical education, research, and care facilities, such as the School of Medicine (second-year to sixth-year students), the Faculty of Nursing and Medical Care (third-year students), the Graduate School of Medicine, and the University Hospital.
The Research Park at the Center for Integrated Medical Research houses research units involving other faculties, universities and research institutions, as well as business enterprises. It promotes strategic interdisciplinary research in the field of life sciences that extends beyond conventional paradigms of research areas and organizations.
The Center for Clinical Research is in the Building for Clinical Research completed in 2008 to provide support for clinical trials and translational research.
http://www.sc.keio.ac.jp/

School of Medicine and Graduate School of Medicine http://www.med.keio.ac.jp/

The School of Medicine was established in 1917, with a world renowned bacteriologist Shibasaburo Kitasato as the first Dean. To overcome the various problems caused by each department working independently, Professor Kitasato instituted a large-class system, which emphasized cooperation between basic and clinical medicine, and the practice of medicine as a practical science. In an effort to carry out the medical education that Professor Kitasato had envisioned, the doctoral program of the Graduate School of Medicine was launched in 1956 and the master's course in 1994 to foster trustworthy medical personnel who combine knowledge, skills, and a well-rounded personality.


Portraits of Yukichi Fukuzawa and Shibasaburo Kitasato

Center for Integrated Medical Research http://www.cimr.med.keio.ac.jp/

The Center for Integrated Medical Research aims to develop interdisciplinary research of medical science, science and technology, social science, and environment and information engineering. It also strives to make contributions to society through their research achievements.
Promoting expansion of diverse cutting-edge research in life sciences, the Research Park, which acts as the Center's strategic research division, leases space (limited, in principle, to 3 years) to research units formed of researchers from various disciplines and institutions who share common objectives.
The Center's "Type J" system provides opportunities for young researchers to be principal investigators to develop groundbreaking research under favorable conditions. The Center also provides space for large-scale projects conducted with research funds from both inside and outside the university, and it functions as the research center for those projects.


Institute of Integrated Medical Research

Center for Clinical Research (CCR) http://www.ccr.med.keio.ac.jp/

The Center for Clinical Research is where the School of Medicine and the Keio University Hospital combine to conduct clinical trials and clinical/translational research (clinical research) that contribute to the development of innovative, cutting-edge medical treatments and revolutionary drugs. The Center provides support for research implementation, starting with consultation at the planning stage and following through from subject recruitment to bio-statistical analysis. It also provides educational research programs for medical personnel.
Beyond clinical research by individual researchers or clinical departments, the Center for Clinical Research promotes systematic clinical research, implementation of clinical trials, and the establishment of support systems backed by the School of Medicine, the University Hospital, and affiliated institutions.

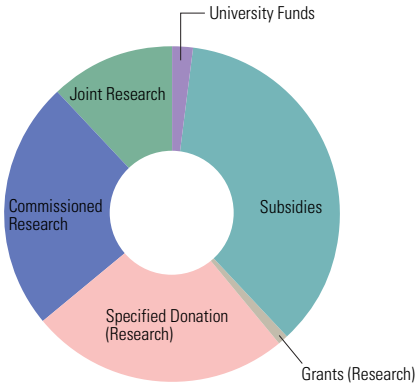

Building for Clinical Research

Keio University Hospital http://www.hosp.med.keio.ac.jp/

The Keio University Hospital has 29 clinical departments, 5 central treatment groups, and 7 cross-sectional cluster divisions of the School of Medicine and the hospital. The hospital receives an average of 4,000 outpatient visits per day and has about 920 inpatients. It accepts over 20,000 emergency patients and handles over 7,000 general-anesthetic surgeries per year. The hospital provides advanced medical treatments as a tertiary hospital and promotes regional medical care through staff exchanges and medical collaborations with 105 hospitals all over Japan.


Keio University Hospital

Research Funds at Shinomachi Campus



Thousand Yen

University Funds	**167,494**
Subsidies	**2,855,950**
Grants (Research)	**67,000**
Specified Donation (Research)	**1,902,535**
Commissioned Research	**1,873,712**
Joint Research	**894,908**
Total	**7,761,599**

Endowed Laboratories in the School of Medicine and the Graduate School of Medicine

Department of Advanced Cardiac Therapeutics (Suntory)

Nisshin-Kyorin Asahi Medical Clinical Research Center of Inflammatory Bowel Disease

Bridgestone Laboratory of Developmental and Regenerative Neuroscience

Johnson & Johnson Ocular Surface Visual Optics

Department of Musculoskeletal Reconstruction and Regeneration Surgery

Inaida Endowed Department of Anti-Aging Ophthalmology

Inaida Laboratory for Anti-Aging Ophthalmology

Inaida Research Center for Anti-Aging Medicine in Hepato-Gastroenterology

Endocrinology and Anti-aging Medicine

Center for Gastroenterology and Clinical Oncology Research (CGCOR)

Novartis Phama Program for Clinical Therapeutics of Hematologic Malignancy

Novartis Pharma Program for Cerebrovascular Disease Prevention Medicine

Department of Cell Biology and Neuroscience

Department of Advanced Therapy for Spine and Spinal Cord Disorders

Schering-Plough Center for the Study of Chronic Liver Diseases

Department of Anti-Aging Musculoskeletal Research

Molecular Metabolism and System Medicine

Daiichi Sankyo Cardiovascular Inflammation

Tokyo Electric Power Company Advanced Medical Sciences and Environmental Preventative Medicine

Integrated Renal Replacement Therapy and Translational Medicine

Frontier Medicine on Metabolic Syndrome

Joint Research Projects

Novartis Pharma K. K.
Exploratory research for new therapeutic targets in cardiorespiratory medicine

Institute of Medicial Moleclar Design Inc
Renoprotective Drug Development targeted to NFκB

Ono Pharmaceutical Co., Ltd.
Pathology of acute lung damage and clarification of molecular structure of convergence and repair capabilities

Noevir Co., Ltd.
Noevir-Keio Translational Research Laboratory: Dept. of Cell Biology and Neuroscience

Kowa Company, Ltd.
Clarification of the physiological role of oxidant stresses in dry-eye

Shionogi & Co., Ltd.
Clarification of molecular structures in renal aging and cardiorenal linkages, and clinical application to cardiovascular accident outbreak control of chronic kidney disease

Mitsubishi Tanabe Pharma Corporation
Creation and functional evaluation of artificial blood platelets by nanoparticles supported by molecule recognition sites

Daiichi Sankyo Co., Ltd.
Keio-Daiichi Sankyo Project on Genetics of Thrombosis

Toshiba Medical Systems Corporation
Non-invasive radiotherapy and diagnostic system for cancer management

GE Yokogawa Medical Systems Ltd.
Improvement of individualized medicine by use of multi-dimensional non-invasive imaging with CT/MR

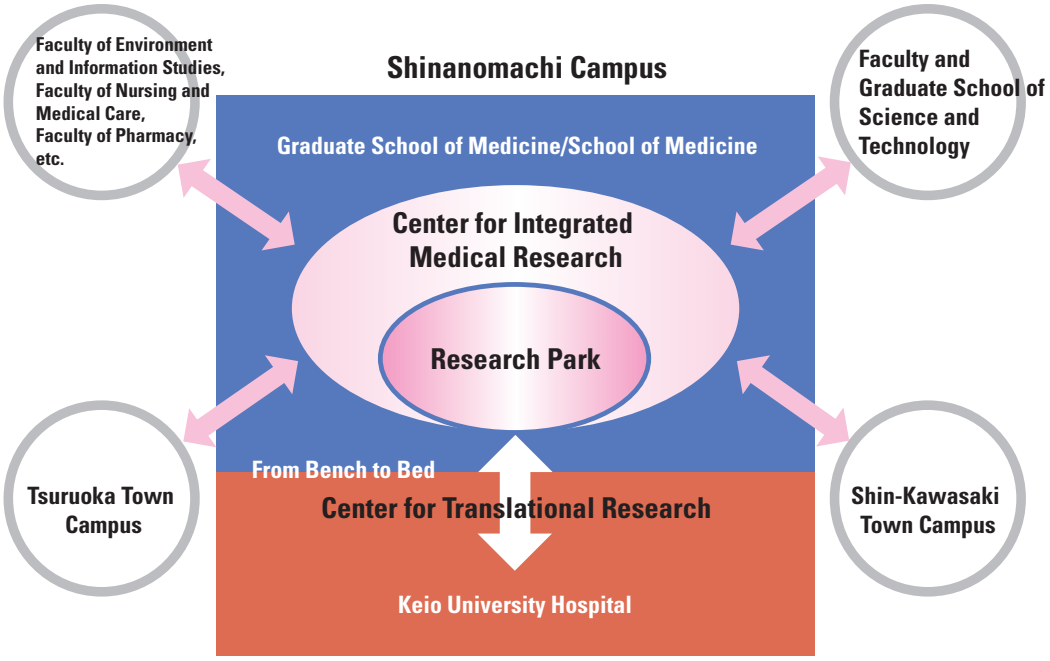
Otsuka Pharmaceutical Co., Ltd.
Keio Stroke Research Center: The Comprehensive Research Projects for Brain Ischemia

LinkGenomics, Inc
Development program from diseases caused by epithelial-tomesenchymal transition (EMT)

Ajinomoto Co., Inc.
The pharmacological action of amino acids in Crohn's disease and analysis of changes in amino acid metabolic balance under pathology

Kyowa Hakko Kirin Co., Ltd.
Analysis of undifferentiated sustainability and self-renewal mechanism of haemoatopoietic stem cells

Thirteen other joint projects




Seminar


Research Park


University Hospital

Keio University Medical Science Fund

In Fall 1994, Dr. Mitsunada Sakaguchi, a 1940 alumnus of the School of Medicine, donated five billion yen to Keio University, with the expressed desire that it be used to encourage medical research and its creative progress at Keio and to promote worldwide medical advances. To fully reflect Dr. Sakaguchi's commitment, Keio launched the Keio University Medical Science Fund on April 1, 1995. Dr. Sakaguchi made an additional donation of two billion yen in July 1999, bringing the fund to a total of 7 billion yen.

Keio Medical Science Prize

Keio Medical Science Prize honors the outstanding and creative achievements of researchers in the field of the medical and life sciences, in particular those contributing to scientific developments in medicine. The prize is awarded irrespective of nationality. Laureates receive a certificate of merit, medal and a monetary award of 20 million yen. The award ceremony, commemorative lectures given by the laureates and commemorative symposium are held at Keio University.

Research Centers

Shonan Fujisawa Campus (SFC)

Contributing to Social Development with Cutting-edge Research Based on Interdisciplinary Cooperation

For Inquiries:

Office of Research Administration,
Shonan Fujisawa Campus
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E-mail: info-kri@sfc.keio.ac.jp

Website of Keio Research Institute at SFC:
http://www.kri.sfc.keio.ac.jp/en/

SFC

The Shonan Fujisawa Campus (SFC) was established in 1990 with the aim of creating a site for research and education based on completely new concepts adapted to the changing times. In addition to the three faculties of Policy Management, Environment and Information Studies, and Nursing and Medical Care, it also has the Graduate School of Media and Governance, which aims to foster highly professional people who will play a major role in 21st Century society, and the Graduate School of Health Management, which further expands and develops the concept of the Faculty of Nursing and Medical Care by providing a program that enables graduates of both the sciences and humanities to tackle the broad subject of "Health". Situated on a futuristic 330,000 square meter campus, SFC seeks to maintain a balance between advanced technology and a rich, natural environment. Research projects serve as the core of a participatory curriculum which instills students with specialized knowledge and practical skills.
http://www.sfc.keio.ac.jp/en/top.html

Campus

Keio Research Institute at SFC

The Keio Research Institute at SFC is an affiliate institute of the three SFC faculties and the Graduate School of Media and Governance, which promotes research activities at SFC.

As a leading center of cutting-edge research in the 21st century, the Institute works to further enhance society's advancement by performing ground-breaking research based on interdisciplinary cooperation and by nurturing a two-way partnership between educational and research activities at the campus. This includes all related activities with industry, government, and academia both within Japan and overseas.

Specific measures to achieve these objectives include the promotion of joint research projects with other organizations and the support of venture incubation efforts. A feature of the Keio Research Institute at SFC is the SFC Research Consortium, which encourages university-led collaborative research by multiple organizations. There are currently 12 such projects under way (as of June 1, 2009).

The Institute has also been commissioned to execute about 190 research projects per year, funded by approximately ¥1.5 billion from government agencies, local governments, and private companies (FY2008 data).

This research is performed not just by researchers within SFC, but also by approximately 400 visiting researchers from outside.

The Institute is committed to presenting the fruits of its research widely to the public so that the results of its efforts can be returned to society.
http://www.kri.sfc.keio.ac.jp/en/

Disseminating research results broadly

SFC Open Research Forum (ORF)

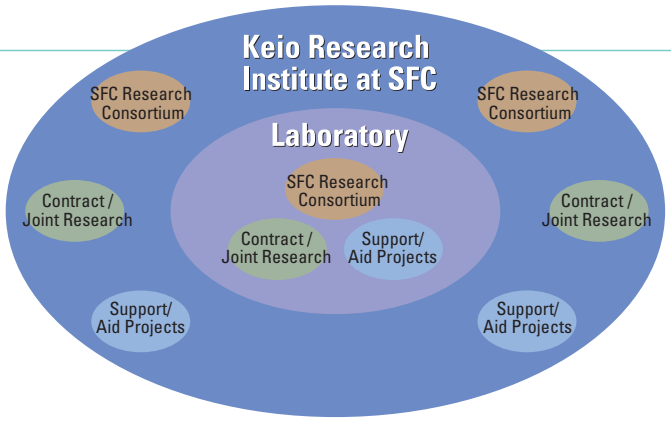
Keio Research Institute at SFC, with the notion that dissemination of its achievements to the public is one of its crucial obligations, holds the SFC Open Research Forum as the occasion to announce broadly its research outcomes. In this forum future prospects and results of many ongoing research projects of the institute are introduced to industries, national and local governments through exhibitions, demonstrations and symposia.
The institute also makes proposals for societies at the forum through various sessions such as panel discussions between experts from industries and governments and researchers of SFC. The SFC Open Research Forum thus intends to facilitate and enhance industry-government-academia activities at SFC, and is an occasion for the institute to have external and objective assessments of its acitivities for development of its future research plans. The two-day SFC Open Research Forum 2009 will be held November 23 and 24 at Academy Hills 40, Roppongi, Tokyo.
http://orf.sfc.keio.ac.jp/

SFC Research Yellow Page

Keio Research Institute at SFC runs a web search service named "SFC Research Yellow Page" to publicize diverse research activities by researchers of SFC to an even larger number of enterprises and organizations. The service is for promotion of transdisciplinary research endeavors leading to actualizations of new research projects as well as consequent technology transfers and generations of new businesses through producing opportunities of encounter between social needs and research activities at SFC.
http://www.kri.sfc.keio.ac.jp/kris-yp/

SFC Open Research Forum 2008

SFC Research Yellow Pages



World - Leading Fusion Research Technology

Laboratory

The Keio Research Institute at SFC provides a laboratory system which enables SFC's researchers to form research groups with people who have different academic backgrounds yet share the same research interests and objectives. These groups carry out interdisciplinary collaborative research projects. Currently, the following 15 laboratories are active (as of June 1, 2009):

- Career Resource Laboratory
- Internet Research Laboratory
- Geo-informatics Laboratory
- Systems Biology Laboratory
- Auto-ID Laboratory
- Ubiquitous Computing & Communication Laboratory
- Platform Design Laboratory
- Healthcare Informatics Research Laboratory
- Keitai Laboratory
- Interaction Design Laboratory
- Community Collaboration Laboratory
- Open Wireless Broadband Platform Laboratory
- Asian Laboratory
- Mieru-ka Laboratory
- Advanced Web Application Laboratory

http://www.kri.sfc.keio.ac.jp/ja/activity/laboratory.html

SFC Research Consortium

The SFC Research Consortium is a unique form of research collaboration in which the university sets the central research theme, invites a number of external organizations such as business enterprises and governments for collaborations, and tackles large research issues while sharing mutual benefits.
Currently, the following 12 consortium projects are active (as of June 1, 2009):

- Building Advanced Information Infrastructure
- Sharing Human Intellect Project
- VCOM
- VSI (Virtual Systems Institute)
- E-CELL Consortium
- DVTS (Digital Video Transport System) Consortium
- e-Care Consortium
- Keio SFC Innovation & Entrepreneurship Platform Consortium
- Referenced Code Development for IMS/SIP system
- Unwired Research Consortium
- Internet Business Innovation consortium
- Regional Informatization Research Consortium

http://www.kri.sfc.keio.ac.jp/en/activity/consortium.html

Introduction to Case Studies

Case Study 1: Faculty of Environment and Information Studies
Atsushi Shinjo Laboratory
Agricultural Platform Building Project


"Dainou"

The Shinjo Laboratory undertakes the building of a next-generation agricultural platform that utilizes IT. The laboratory aims to realize high-return, low-risk agriculture by accumulating the superior cultivation know-how of veteran Japanese producers, whose experience has been fostered in a small country, using sensor networks, and making this knowledge explicit using data mining. This is expected to contribute to further production improvements by veteran producers and decreases in the cultivation risks faced by new agriculture entrants. Presently, farming families, retailers, and wholesalers in various areas in Japan are participating, and approaches using various agricultural products are being advanced.
The photograph shows the "Dainou", where juices are made from tomatoes that have been cultivated in the experimental farm. The name is taken from a passage in Yukichi Fukuzawa's book "The Advancement of Learning", which says, "If you enter into studies, you should study hard. If you practice agriculture, you should practice large-scale agriculture." The juice has a richly flavored taste.l

Case Study 2: Graduate School of Media and Governance, Faculty of Environment and Information Studies
Hiroto Kobayashi Laboratory; Use the "Trees/Wood", Shiga Prefecture, Nagahama City
Tane Village Reclamation Project


"Reinforcing old style houses by using new materials"

The Kobayashi Laboratory is making progress on a project to revitalize declining mountain villages by using local forests and traditional wooden old-style houses. In areas plagued with problems such as depopulation, low birth rates, and damage due to animals, the Kobayashi Laboratory is renovating old-style homes and constructing new ecologically friendly homes by using wood from local forests, and making policy proposals for forestry industries. This is a plan to increase number of young families that return. In addition, fixing amounts of CO_2 by appropriately using wood materials, reforestation, and the creation of new life styles are being targeted that are possible especially because of the small regional circulation systems.
http://hirotolab.sfc.keio.ac.jp/

Ground-Breaking Partnerships with Industry, Government, and Academia

SFC Forum

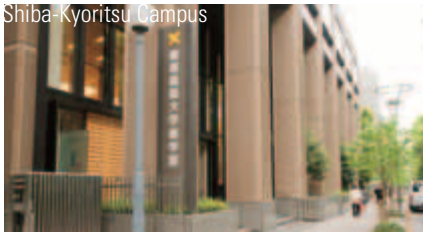
The SFC Forum is a "place" for communication where leaders of the business world and university staff can carry out discussions over a wide range of fields.
In the 2009 program for the regular lunch meetings, which are a pillar of the movement, seminars by instructors in various specialist fields are provided under the theme of "Our Sense of Thought and History".
http://www.sfc-forum.sfc.keio.ac.jp/


SFC forum

Venture Incubation Support

Keio University has set up incubation facilities (Keio Fujisawa Innovation Village) in cooperation with the Organization for Small & Medium Enterprises and Regional Innovation, Fujisawa City, and Kanagawa Prefecture.
These facilities are offered for rent, subject to local conditions suitable for industrial startups, to those who wish to utilize the fruits of university research to create new businesses, or to those who wish to form new companies in partnership with university researchers who already have suitable expertise.
A number of incubation managers are available on-site to give support such as advice on industrial startups and matchmaking with corporations.
Since the initial public offering in November 2005, the facilities have maintained an occupancy ratio of over 90%, and activities leading to industrial startups are continuing.


Keio Fujisawa Innovation Village



Research Centers

Shiba-Kyoritsu Campus

Platform for the dissemination of information to guide the future of pharmaceutical sciences

For Inquiries:

The Group for Research Administration,
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105-8512 Japan
TEL: +81-3-5400-2653
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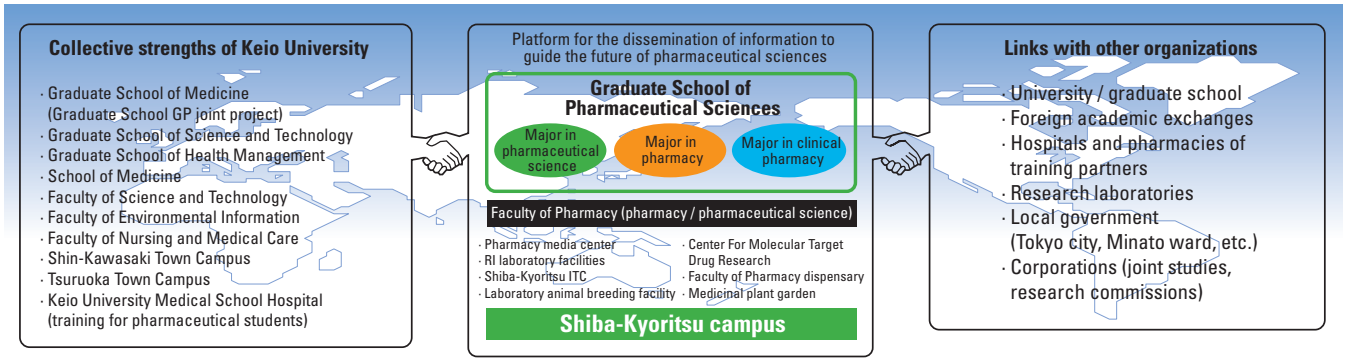
E-mail: skc-shien@adst.keio.ac.jp

Faculty of Pharmacy / Graduate School of Pharmaceutical Sciences

The Faculty of Pharmacy and the Graduate School of Pharmaceutical Sciences were set up in April 2008 as the result of a merger with Kyoritsu University of Pharmacy. After this merger, we continued to use the equipment and facilities at the Shiba-Kyoritsu campus in Shiba koen, Minato Ward for education and research. Over the period of eight decades since its establishment in 1930, Kyoritsu University of Pharmacy has turned out some 13,000 pharmacists and pharmaceutical researchers and has attained a leading position in the field of pharmaceutical research. By carrying on this outstanding track record and building on the comprehensive capabilities of Keio University, we hope that this new Faculty and Graduate School will continue to lead the way forward in the field of pharmaceutical sciences with regard to education, research and contributing to society.

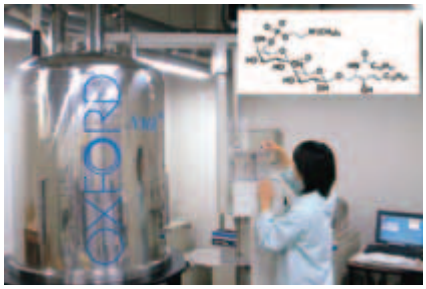
Aims of the Graduate School of Pharmaceutical Sciences

Pharmaceutical sciences are under increasing pressure to deliver results not only for the benefit of society but also for improving the quality of medical care. To promote the latest medical advances and contribute to the nation's health, the mission of the Graduate School of Pharmaceutical Sciences is to foster the ability to gather information from around the world, acquire knowledge of advanced leading-edge medical treatments, and educate talented individuals with specialist skills.
At the Graduate School of Pharmaceutical Sciences, we carry out advanced pharmaceutical education and research in a diverse range of pharmaceutical disciplines including pharmaceutical science, chemotherapy, biochemistry, drug targeting (delivery), patient compliance instruction/drug dispensing, medical product information, pharmacokinetics, pharmacology and pathology. Our aim is to produce researchers and engineers capable of developing new medical products, and to nurture talent in all manner of situations including clinical research organizations (CROs), food manufacturers, the chemical industry, developers of cosmetics, and government facilities.
In each of these fields, we aim to incorporate international aspects into the education and research activities at the Graduate School in order to produce individuals who are capable of operating on an international level.

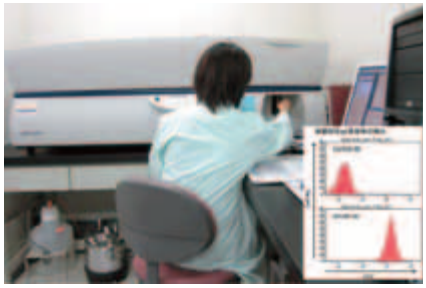


Center For Molecular Target Drug Research

This center was established to contribute widely to the development of molecular targeted therapeutic research and to efficiently promote the formation of a DVD research and development center for cell signaling targeted drug discovery in support of strategic research by private universities and the Ministry of Education, Culture, Sports, Science and Technology (MEXT). It does this by bringing together leading researchers at the Graduate School of Pharmaceutical Sciences and by carrying out basic research and development. The center also takes care of the administrative and business aspects of research apparatus necessary for leading-edge research.



Nuclear magnetic resonance (NMR) equipment
This equipment obtains information about the 3D structure and specific nuclear bonding states in chemical compounds by subjecting them to electromagnetic pulses tuned to resonate with atomic nuclei that spin when the compound is placed in a magnetic field. This is a powerful technique for the structural analysis of natural materials and organic compounds.



Flow cytometer
This equipment rapidly separates cells by using various indicators such as surface antigens. This makes it possible to analyze the properties of cell groups in a short time, and to separate still-living cells based on their individual properties.

Confocal laser scanning microscope
This microscope can produce high-definition 3D visualizations of the structure of biologically active molecules such as proteins and nucleic acids, and the locations of these molecules inside cells. Uses include making prolonged observations of living cells, and stimulating cells with light of a specific wavelength.

From drug discovery to clinical trials — **performing extensive "Pharma Sciences" research to exploit the multi-faceted nature of pharmaceutics**

At the Graduate School of Pharmaceutical Sciences, we aim to build on the collective strengths of Keio University while improving our research level links with other graduate schools, and we will continue to promote links between government, business and academia in the field of pharmacy by promoting exchanges of students and teaching staff. We not only aim to teach and research the latest technology, but we are also working at further strengthening our research infrastructure by actively inviting eminent researchers from outside the university, especially from foreign educational establishments.

Supporting the formation of a strategic research infrastructure

In addition to the independent research achievements made in each of the 20 or so courses we have on offer, the Graduate School of Pharmaceutical Sciences has also been selected to participate in the Strategic Research Base Development Program of the Ministry of Education, Culture, Sports, Science and Technology (MEXT), which is a cross-disciplinary research project that includes participation from external organizations. In the 2009 academic year, one new subject was selected, and we are now working on three research projects.

Formation of a research centre in cell signaling drug discovery for molecular targeting therapies

(2009–2013 research representative: Professor Hideko Kanazawa)

Due to recent pharmaceutical developments including the development of molecular targets, substantial improvements have been made in the treatment of hitherto intractable diseases, and as a result many patients now experience a better quality of life. We aim to lead the world in drug discovery R&D by establishing a research system with deeper links to facilities such as the Graduate School of Medicine and Graduate School of Science and Technology centered on the Center For Molecular Target Drug Research which was established as a research center in the Graduate School of Pharmaceutical Sciences. Specifically, we will construct a centralized drug discovery research system that brings together the know-how and technology of drug discovery, such as drug design and synthesis, drug screening (D; design), analysis of pharmacological / biological action, investigation of pharmacokinetics and metabolites (V; validation), and drug delivery (D; delivery). Furthermore, by strengthening our research links with other universities, we aim to discover new drug discovery targets and seeds originating from universities, and to encourage new growth in practical research.

Establishment of efficient drug development method and side effect reduction method by analysis of factor that influences pharmacokinetics

(2007–2011 research representative: Professor Tadahiko Mashino)

It takes significant cost and time to develop drugs, and the success rate is very low. This is partly due to the pharmacokinetics of candidate compounds, whereby candidates that show good activity in vitro often fail to result in useful drugs due to issues with their *in vivo* kinetics. The side-effects and interactions of drugs are also closely related to their *in vivo* kinetics. To address this issue, we aim to make drug development more efficient and reduce side-effects and drug interactions by developing methods for improving pharmacokinetics by analyzing the two factors, "the chemical structure of candidate compounds" and "the control of transporters and metabolic enzymes". In the search for new drug candidate compounds, pharmacokinetic prediction systems are also being developed, but these are passive predictions based on the analysis of prior data. We are therefore actively analyzing factors that have pharmacokinetic effects by carrying out a wide-ranging study including fields from organic chemistry, natural products chemistry, molecular biology, analytic chemistry and clinical research.

Development of new treatments for intractable diseases based on clarification of molecular mechanisms in response to stress

(2006–2010 research representative: Professor Yoshikazu Sugimoto)

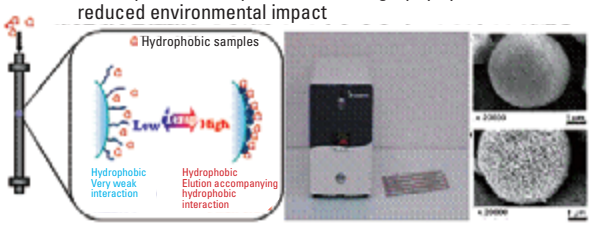
A stress response is a natural defense mechanism whereby a living organism protects itself from various external stimuli. However, in recent years it has become clear that problems such as neurological disorders and allergic diseases can be caused by failure of stress response mechanisms, or even by stress responses themselves. In cancer treatments, the stress response of cancer cells leads to increased drug resistance and apoptosis resistance, so controlling the stress response of cancer cells is thought to be essential for increasing the efficacy of cancer drug treatments. This project aims to analyze biological stress response mechanisms in such terms as oxidative stress, inflammation, allergies and reactions between cancer and drugs, and to develop new drugs that are effective at weakening or modifying the stress response. In this way, we hope to contribute to the development of preventative medicines, diagnostic methods and treatments for diseases that are on the increase in our ageing society, such as cancer, neurological disorders, heart disease and allergic disease.

Links between industry, government and academia — Research examples

Ministry of the Environment: Development of a aqueous chromatography system with lower environmental impact

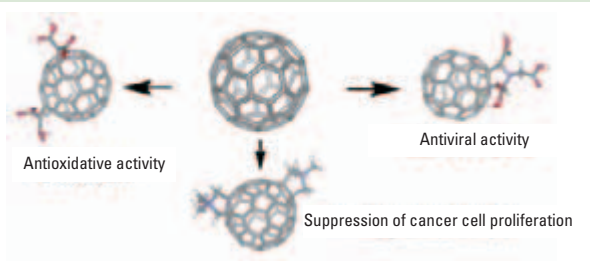
In this study, we are developing a novel chromatography technique that uses no environmentally harmful organic solvents and requires no waste water treatment. We are also developing a sophisticated analysis method for biological samples and environmental samples based on this chromatography technique. In 2005, the National Institute for Environmental Studies and a group led by professor Hideko Kanazawa of the division of Physical Pharmaceutical Chemistry began working on a study commissioned by Ministry of the Environment. Substantial progress is being made towards achieving the initial objective of this study, which is to establish environment analysis methods that are environmental friendly.

Development of a aqueous chromatography system with reduced environmental impact



Vitamin C60 BioResearch Corporation The effects of antioxidant, fullerenes, on inflammation and physiological responses

Fullerenes exhibit various novel activities such as antioxidant effects, suppression of cancer cell proliferation and antiviral activity. These are being clarified by the division of medicinal chemistry, the Graduate School of Pharmaceutical Sciences, Keio university, and are being put to practical use in cosmetic products linked to their antioxidative activity. In this funded research, we are studying the anti-inflammatory effects of fullerenes together with the venture business Vitamin C60 BioResearch Corporation.



Funded research achievements

- Pharmaceutical tests in the phase III clinical trials of famciclovir in the treatment of herpes zoster
- Action of prostaglandin D2 receptors (DP) on activity of the lymphocyte cholinergic system
- Performance evaluation of the newly-developed HPLC column, and its application to real (clinical) samples
- New medication methods for novel compounds and known compounds
- Effects of MEK inhibitors on the expression of P-glycoproteins
- Creation of novel anti-human urate transporter-1 (URAT1) antibodies
- Idiosyncrasies of transporter inhibition, and the effects of these compounds on transporter expression
- Investigation of the social contribution of OTC pharmaceuticals

Research of medical systems

- Investigation of population pharmacokinetics parameters for the design of early-stage administration of vancomycin hydrochloride to newborns and infants with congenital heart disease
- Investigation of tacrolimus and azole antifungal agent drug interactions in hematopoietic stem cell transplant patients
- Assessment of malaise in gynecological patients treated with weekly doses of paclitaxel and carboplatin
- Analysis of adenosine uptake mechanisms using rat placental brush border membrane vesicles
- Investigation of patient background factors related to thrombocytopenia and the state of linezolid use
- The effects of helicobacter pylori and QOL changes in patients on low-dosage aspirin with upper gastrointestinal disorders

Research Centers

Shin-Kawasaki Town Campus

Open and Cutting-edge Research Facility Pursuing Industry-Government-Academy -Region Collaboration

For Inquiries:

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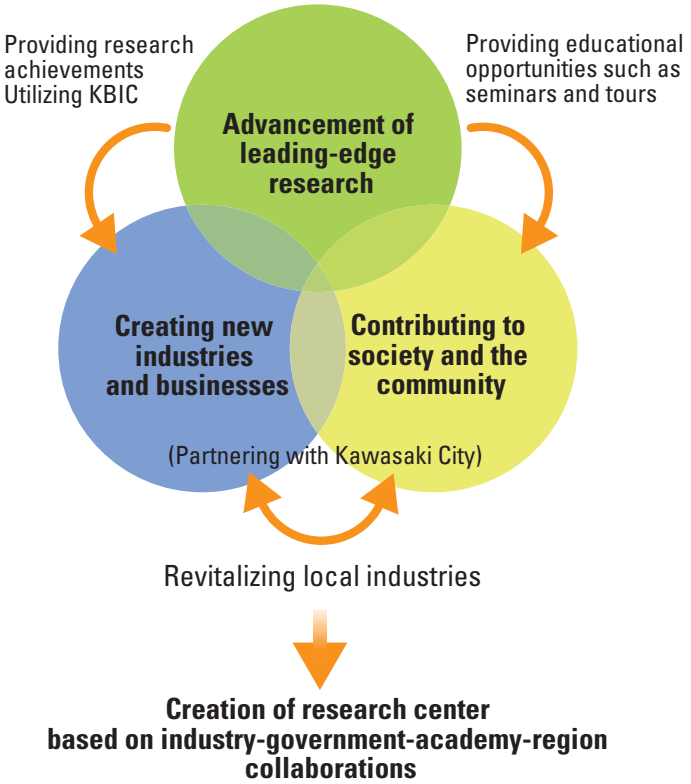
TEL: +81-44-580-1580 FAX: +81-44-580-1570
http://www.k2.keio.ac.jp/
E-mail: k2-tc@adst.keio.ac.jp

The Shin-Kawasaki Town Campus, popularly known as the K² Town Campus, was established in the spring of 2000 as a facility responsible for cutting-edge joint research among industry, government, academy and region through collaboration and cooperation with Kawasaki city. K² ("K Square") represents the double meaning of (1) Keio (one "K") and Kawasaki (another "K") teaming up and thereby producing a squared effect by joining forces, and (2) the campus square (plaza). Currently, 14 research projects are being developed and 400 registered researchers (professors, joint researchers and post graduate students) are carrying out interdisciplinary research activities. The K² Town Campus is a leading-edge, collaborative, interdisciplinary research-oriented campus. With three central tenets of "Advancing leading-edge research," "Creating new industries and business," and "Contributing to society and the community," we provide support for various research activities as a campus that paves the way to a new age. Our three tenets are inextricably bound together.



Advancing Leading-edge Research

Large-scale projects underway at the campus include the "Creating the Co-Mobility Society" project, funded by the Ministry of Education, Culture, Sports, Science and Technology (MEXT)'s "Creation of Innovation Centers for Advanced Interdisciplinary Research Areas" program (Special Coordination Fund for the Promotion of Science and Technology); the "High-Level Global Cooperation for Leading-Edge Platform on Access Spaces" project, funded by MEXT's Global COE Program, and the "Photonics Polymer for Fiber to the Display" project, funded by Japan Science and Technology Agency (JST)'s Exploratory Research for Advanced Technology (ERATO).

Creating New Industries and Businesses

In the aim of creating new business, we hold the "Business Matching" program by matching our research achievements (seeds) from each research project with the needs of businesses and institutions. Also, by partnering with the Kawasaki Business Incubation Center (KBIC), which is situated just next door to the campus, we deepen the possibility of commercializing our research achievements.

Contributing to Society and the Community

In partnership with Kawasaki city, we hold Open campus and Open seminars for community residents and businesses, and provide learning opportunities concerning science and technology. We are also carrying out educational and experiential programs on science, such as tours and seminars on electric cars aimed for children.

Research Projects * Completed in FY2008 ** New Project starting in FY2009

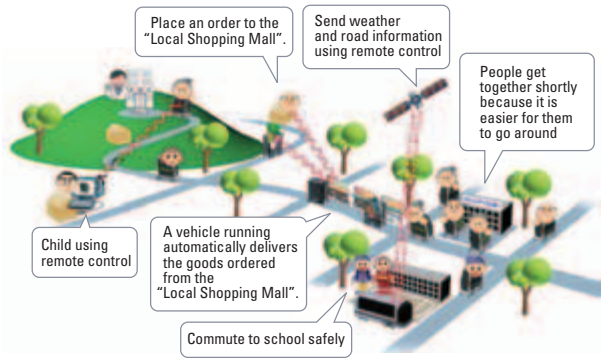
K-Building	**Project on Search and Development of Intriguing Chemicals for Health Foods**	Daisuke Uemura, Professor, Faculty of Science and Technology
K-Building	**New Generation Terabit Core/Access Network Research Project**	Naoaki Yamanaka (Professor, Faculty of Science and Technology)
K-Building	**Project on Advanced Light-Wave Control Technologies**	Fumihiko Kannari (Professor, Faculty of Science and Technology)
K-Building	**Technology of Air Cleaning for Creating the Comforts of Life**	Shigeru Tanaka (Professor, Faculty of Science and Technology)
K-Building	**Project on Naturally Occurring Huge Molecules** **	Daisuke Uemura (Professor, Faculty of Science and Technology)
K-Building	**Integrated communication network technology of visible light communication**	Masao Nakagawa (Professor, Faculty of Science and Technology)
K-Building	**Distributed Real-time Controlling Project**	Nobuyuki Yamasaki (Associate Professor, Faculty of Science and Technology)
K-Building	**Research Project on Secure and Reliable System Software**	Kenji Kono (Associate Professor, Faculty of Science and Technology) **
E-Building	**ERATO-SORST Koike Photonics Polymer Project**	Yasuhiro Koike (Professor, Faculty of Science and Technology)
I-Building	**High-Level Global Cooperation for Leading-Edge Platform on Access Spaces**	Kouhei Ohnishi (Professor, Faculty of Science and Technology)
O-Building	**Next Generation Nano-technology Thin Film Project**	Seimei Shiratori (Associate Professor, Faculty of Science and Technology)
O-Building	**The WIDE Project**	Jun Murai (Professor, Faculty of Environment and Information Studies)
O-Building	**Future Vehicle Project**	Hiroshi Shimizu (Professor, Faculty of Environment and Information Studies)
O-Building	**Co - Mobility Society Creation Project**	Yuichiro Anzai (President, Keio University)
K-Building	**Project on Developing High Reliability of Devices with Mechanical Contacts** *	Toshiyuki Murakami (Professor, Faculty of Science and Technology)

Promotion of Leading-edge Research

The research projects described in the following are some representative examples of those currently being undertaken at Shin-Kawasaki Town Campus.

"Creation of Co-Mobility Society" MEXT Special Coordination Funds for Promoting Science and Technology Creation of Innovation Centers for Advanced Interdisciplinary Research Areas

Hironao Kawashima, Director of Co-Mobility Society Research Center



Adopted in 2007 and continued throughout 2008 and 2009, "Creation of a Co-Mobility Society" is a cooperative project between industry, government and academia that aims to promote research and development firmly focused on prospective practical applications of research findings and to nurture the researchers and engineers—across faculties and graduate schools—who will shoulder the next generation. As a cooperative body, five leading companies from the fields of information and communications (IT) technology and mobile technology are participating in the project.

The "co-mobility society," namely, a creative and civilized society in which everyone from children to the elderly can move around freely and safely, intermingle easily, and live comfortably, is the target of this research project—which aims to create the social infrastructure for underpinning such a society.

This research is aiming to establish the "co-mobility society infrastructure" for linking the real and virtual worlds by means of expanding and integrating each research theme around the three axes of "community science," "mobility science," and "human-harmony science," creating new hybrid communities, and propagating these communities through society on a grand scale. Moreover, for application to the everyday world, several model districts were set up, and cooperative agreements were signed with Kurihara city in 2007, Okutama town in October 2008, and Aomori city in February 2009.

For better local communities, creation and dissemination of the models which are applicable to other regions are being undertaken, by means of test running of small electric vehicles that can run automatically as one way of moving around communities in the co-mobility society, formation of communities that consist of "information space" and "real space" for revitalization of downtown areas, remote medical care, verification tests for assuring and communication channels during disasters.

High-Level Global Cooperation for Leading-Edge Platform on Access Spaces

Program leader, Professor of Graduate School of Science and Technology, Kohei Ohnishi

To develop a world-wide stronghold for the global research cooperation, at Shin-Kawasaki Town Campus, Building I, about 100 affiliated researchers and students (including research assistants, RAs) are involved in cutting-edge research activities on the following four projects, (i)Basic engineering physics for innovative photonic/electronic device creation; (ii) Environment-embeded device technology, (iii) Real-world and real-time network for multi-dimensional processing and communication, and (iv) Perception and expression technology.

FY2008 produced many achievements in the field of international cooperation activities such as international workshops at nine overseas universities of project partners. At the Shin-Kawasaki Town Campus, special lectures—to which 30 researchers who are active overseas are invited—were held.

Furthermore, RAs and researchers took the chance to study from a global perspective with a number of researchers at the forefront of various fields—like Professor Asif Sabanovic of Sabanci University, Turkey, who resided on campus 11 months from May 2008 to perform collaborative research—who participated in these educational activities (such as lectures).

Creation of new industries and businesses

"Company-business matching"

In 2008, discussions, mainly with industrial researchers, on the possibility of new manufacturing and new businesses were held a total of two times.

First discussion: October 4, 2008
Conduct: Ohnishi Research Laboratory (Building I), and Koike Research Laboratory (Building E)

Second discussion: 7 February, 2009
Conduct: Uemura Research Laboratory (Building K),

Kawasaki Business Research Center (KBIC)

At the incubation facility set up by Kawasaki city in 2003, researches aiming to start or develop businesses based on the results of the projects. (including already commercialized research laboratories) are currently underway.

Contributions to Society and Regions

Open campus

At the 2008 open campus, opened by addresses of Yuichiro Anzai, President of Keio University and Takao Abe, Mayor or Kawasaki city, all projects were disclosed, and a great number of citizens, students, and staff of various companies attended. Date held: 4 October, 2008

Open Seminar

As a cooperative project with Kawasaki city, open seminars in which citizens (including many youngsters) and business people could experience cutting-edge technology in their own backyard, were held on the three occasions detailed as follows:

First seminar: 4 October, 2008; "Telehaptics" (remote medical care) (Lecturer: Kohei Ohnishi, Professor of Faculty of Science and Technology)
Second seminar: 4 October, 2008; "Communications by light! Let's try to make light-string phones!" (Lecturer: Naoaki Nakayama, Professor of Faculty of Science and Technology)
Third seminar: 7 February, 2009; "Effective utilization of marine creatures in medical fields and the Nobel Prize." (Lecturer: Daisuke Uemura, Professor of Faculty of Science and Technology)

Research Centers

Tsuruoka Town Campus

The world's leading pioneer in Integrative Systems Biology

For Inquiries:

Tsuruoka Town Campus
Keio Frontier Research & Education Collaborative Square at Tsuruoka
14-1 Baba-cho, Tsuruoka-shi, Yamagata, 997-0035 Japan
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In April 2001, Keio University established Tsuruoka Town Campus of Keio (TTCK) in Tsuruoka City, Yamagata Prefecture, with the cooperation of Yamagata Prefecture and the municipalities of Shonai region. The cornerstone of the campus is the Institute for Advanced Biosciences (IAB).
Research at IAB is conducted at two facilities: the Center Building and the Bio-lab.

TTCK conducts, closely and jointly with the other campuses of Keio, research and development in advanced areas and enhances research and educational activities. It proactively transfers newly created technologies to local governments and businesses to encourage industry-government-academia collaboration, for contributing to regional development as well as to the advancement of science and technology in Japan.


Bio-lab

Institute for Advanced Biosciences (IAB)

The Institute for Advanced Biosciences, Keio University, located in Tsuruoka city, Yamagata prefecture, is a pioneer in the new life science field of "Integrated Systems Biology".
Using cutting-edge biotechnology, intracellular metabolites can be analyzed comprehensively to construct computer simulation models and that can be applied in fields such as medical science and also the food industry.
http://www.iab.keio.ac.jp/

Major Research Projects

Ministry of Education, Culture, Sports, Science and Technology

•Global COE Program
"Global COE for human metabolomic Systems Biology" (2007-2011)

Ministry of Health, Labour and Welfare

•Health and Labour ScienceResearch Grants
Research on Risk of Chemical Substances:
"Research related to the development of methods for evaluating the harmfulness of chemical substances using metabolome analysis and biomarkers" (2007-2009)

•Health and Labour Science Research Grants
Third Term Comprehensive Control Research for Cancer
"Research related to the construction of multidisciplinary treatment algorithms targeting primary breast cancer based on the introduction of biomarkers, and to the formulation of decision-making processes" (2007-2008)

•Health and Labour Science Research Grants
Research on Biological Markers for New Drug Development
"Biomarker discovery of drug induced hepatitis by global analysis of intracellular molecules"(2008-2012)

•Grant-in-Aid for Cancer Research
"Research on Development of new medical treatment based on cancer biology: cancer metabolomes" (2005-2008)

New Energy and Industrial Technology Development Organization

•Functional RNA Project
"Analysis of the functions of functional RNA" (2005-2009)

Japan Science and Technology Agency

•Basic Research Programs (CREST)
"Modeling and construction of simulation environments for Systems Biology" (2004-2008)

•Basic Research Programs (PRESTO)
"Development of ultramicro-electrospray ionization approaches for-omics research" (2006-2009)

•Bioinformatics Operations
"Development of Metabolome MS Spectral Integration Database" (2006-2010)

•Comprehensive Support Programs for Creation of Regional Innovation Science and Technology Incubation Program in Advanced Regions (Promotion Research)
"Protein phosphorylation display for drug discovery and diagnosis" (2008-2010)

•Comprehensive Support Programs for Creation of Regional Innovation Science and Technology Incubation Program in Advanced Regions (Research for Promoting Technological Seeds)
"Effect of waste mushroom bed composted by beetles as organic nursery bed" (2008)

Yamagata Prefecture and Tsuruoka City

"Development of fundamental technologies using Systems Biology (simulations software techniques, metabolome analysis techniques, genome design techniques, proteome analysis techniques) and their applications (medical, food, and environment)" (2006-2010)

Research System

Major Joint Research Organizations
The Faculty of Science and Technology, the School of Medicine, Shonan Fujisawa Campus, RIKEN, and Human Metabolome Technologies, Inc., BioSigma S.A. (Chile), DENSO CORPORATION, Kirin Holdings Company, Limited, Kao Corporation, Spiber, Inc.

Educational Activities

The IAB develops and deploys educational activities for students with different majors in undergraduate or graduate school of Keio University, under the ideal that advanced research and education should be inseparable. In FY2008, 37 students in the spring semester and 42 students in the fall semester participated in the programs and activities offered at TTCK.

Bio Camp
The Bio Camp is a program for students of the Shonan Fujisawa Campus (SFC) of Keio to spend two semesters (or one semester) at the TTCK and experience the basics of biotechnology. The program begins with an introduction to the handling of laboratory instruments because the students have no experience with experiments. Each student extracts Human DNA and analyzes the gene for alcohol-degrading enzymes, and diagnoses through genetic testing level of tolerance for alcohol is high or low. At the end, the students decode the genome sequences through state-of-the-art DNA sequencers.

Systems Biology Program
This Program is a rare graduate program in the world in the sense that students can earn credits using the abundant research resources of both the SFC (bioinformatics) and IAB (Systems Biology). At TTCK, a number of experiments and laboratory trainings are provided, such as "metabolome analysis" and "proteome analysis", using the most advanced DNA sequencers, bioreactors, and CE-MS equipment

Events

Introduction to Bioscience for Tsuruoka Citizens
The introductory bioscience course for general public and taught by researchers of the IAB. There were 95 participants in FY2008.

Summer Bio College
This is a basic hands-on program in biotechnology aimed at high school students in the Keio's affiliated high schools. There were 16 participants in FY2008.

Keio Summer Bio Camp
This is a basic hands-on program in biotechnology for any high school students from all over Japan. There were 14 participants in FY2008.

Spring Science Camp
This is a basic hands-on program in biotechnology for any high school students from all over Japan. (Sponsored by: Japan Science and Technology Agency) There were 16 participants in FY2008.

Commercialization

A Bio-venture Company from Keio University
Human Metabolome Technologies, Inc. (HMT)
http://humanmetabolome.com/

Human Metabolome Technologies, Inc. (HMT) is a venture company established in July 2003 by professor Masaru Tomita, professor Tomoyoshi Soga, and others from the IAB, based on the IAB's measurement and analysis technology for metabolomes. HMT conducts R&D aimed at industrial applications in medical care, drug discovery, food fermentation, etc. In October 2003, HMT became the first company to be invested by the Entrepreneur Assistance Fund of Keio University. HMT has realized cost reductions for custom metabolome analysis by automating the analytical process. In addition to broadening the customer base for pharmaceuticals, chemistry, and the food industry, HMT is advancing exploratory research on disease biomarkers in the areas of mental and life-style diseases by cooperative research in association with, for example, public institutions.

High-throughput and quantitative CE-MS methods which can measure thousands of charged metabolites. This is a powerful new research device developed by IAB.

Other Related Facilities

Tsuruoka Metabolome Campus was founded in 2005 as a research facility by Tsuruoka City which aims at cluster formation of bioresearch and development with IAB as its cornerstone. In addition to IAB's Metabolome group, Human Metabolome Technologies Inc., RIKEN, School of Medicine,Keio University, NISHIKAWA KEISOKU Co., Ltd., BioSigma S.A. (Chile), and Spiber Inc. are on the campus conducting research.

Tsuruoka Metabolome Campus

Major Awards

November 2001
"Yamagata Keizai Doyukai (Association of Corporate Executives) Grand Prize, Yamagata Landscape Design Award"

June 2003
"Nihon Kogyo Shimbunsha Award in the 17th Dokusousei wo Kirihiraku Sentan Gijutu Taishou (Leading-edge Technology for Originality andCreativity)"

November 2003
"IBM Shared University Research Award"

June 2004
"Industry-Academia-Government Collaborative Distinguished Service Commendation (Award of the Minister of State for Science and Technology Policy)"

April 2005
"First Prize in the 5th Japan Biotechnology Business Competition"

April 2007
"Prize for Science and Technology in the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science, and Technology"

Introduction to publicly funded research

In recent years, Keio University has had an excellent record of accomplishment in obtaining the following prominent competitive research grants. Both the educational research activities and the research results supported by these grants have been highly regarded in Japan and abroad.

Global COE Program

Out of its original 12 programs under the 21st Century Center of Excellence (COE) project, a government-sponsored initiative to develop advanced research centers at Japanese universities, Keio University is currently operating seven Global COE programs. These Global COE Programs set up individual research and education centers within Keio University's Advanced Research Centers, which are flexible, interdisciplinary organizations that ensure mobility without any boundaries imposed by faculties or graduate courses. Each program works together with existing education and research programs. Through the these programs, internationally distinguished research and education centers are being created through the strengthening and enhancement of the education and research functions of Keio's graduate school, and processes to foster the development of young researchers have been established. Thus, through these programs, Keio is moving forward to create a university that meets the highest global standards.

Centers Selected in the Global COE Program

Page	Adopted Year	Field	Home Campus*	Program title	Program Leader
P.31	2007	Life sciences	Shinanomachi	Global COE for Human Metabolomic Systems Biology	Makoto Suematsu, Professor, Graduate School of Medicine
P.31	2007	Information sciences, electrical and electronic sciences	Yagami	High-Level Global Cooperation for Leading-Edge Platform on Access Spaces (GCOE)	Kouhei Ohnishi, Professor, School of Science and Technology
P.32	2007	Humanities	Mita	Center for Advanced Research on Logic and Sensitivity	Shigeru Watanabe, Professor, Graduate School of Human Relations
P.32	2008	Medical sciences	Shinanomachi	Education and Research Center for Stem Cell Medicine	Hideyuki Okano, Professor, Graduate School of Medicine
P.33	2008	Mechanical, civil engineering, architectural and other fields of engineering	Yagami, Hiyoshi	Center for Education and Research of Symbiotic, Safe and Secure System Design	Takashi Maeno, Professor, Graduate School of System Design and Management
P.33	2008	Social sciences	Mita	Raising Market Quality - Integrated Design of Market Infrastructure	Naoyuki Yoshino, Professor, Graduate School of Economics
P.34	2008	Social sciences	Mita	Designing Governance for Civil Societies	Yoshihisa Hagiwara, Professor, Graduate School of Law

*Home Campus: Affiliate region of research representative

Special Coordination Fund for the Promotion of Science and Technology

The Special Coordination Fund for the Promotion of Science and Technology is operated by the Ministry of Education, Culture, Sports, Science, and Technology in accordance with the plans and objectives of the Council for Science and Technology Policy. The fund provides competitive grants for policy-directed research activities. The funds the provided are used for policy-directed research projects that have high effectiveness. The funds support projects such as the following: projects that relate to government ministry policy initiatives; projects that cannot be covered by the policies of each ministry; projects from which synergistic effects can be expected due to inter-agency cooperation; and projects that require a flexible approach. The overall objectives of the Council's provision of these funds are:
(1) Reform of scientific and technical systems to create and apply excellent results,
(2) Strategic response to emerging, promising research areas, and
(3) Promotion of internationalization of scientific and technical activities.
In line with the above Council objectives, Keio University focused in FY2008 on developing young researchers as well as upgrading and expanding efforts to strengthen scientific and technical exchange. We also made improvements in further promoting scientific and technical systems reform, with respect to continuing, publicly funded programs.
The following four programs have been set up for 2008 :
1) Reform of the Development System for Young Researchers (Promotion of Environmental Improvement for Independence of Young Researchers, Development of Young Innovative Researchers),
2) Reform of the Support System for Female Researchers (Support Model for Development of Female Researchers, Accelerated Reform of the Support System for Female Researchers)
3) Creation of a Base for the Regeneration of Local Human Resources 4) Strategic Promotion of Scientific and Technical Cooperation with Africa and Asia (Creation of a Base for the Development of Strategic Environmental Leaders, Promotion of Joint International Research)
In FY 2008 Keio University adopted three plans for the development of its human resources. To reform its development system for young researchers, it focused on the development of young scholars who will lead research into the foundations of 'Cells and Metabolism' and on the development of medical students with PhDs. To reform its support system for female researchers (a support model for development of female researchers), it focused on support for female researchers that will enhance social capital.

Research in Progress from 2008

Affiliation	Position	Research Representative	Program	Research Theme
School of Medicine	Professor	Sadakazu Aiso	Fostering talent in emergent research fields	Training Course for Technical Assistants on *in vivo* Medical Science
School of Medicine	Associate Professor	Kenji Watanabe	Promotion of Versatile Responses to Important Policy Themes	Scientific Evaluation of Alternative Treatments and Integrative Medicine; Study and Research of Methodology
Faculty of Science and Technology	Associate Professor	Kenji Kono	Promote Research Activities to Tackle Important Issues	Producing Highly Attack-Resistant Secure Operating Systems
Faculty of Science and Technology, Faculty of Environment and Information Studies, Graduate School of Media and Governance, etc.	Professor	Hironao Kawashima	Creating of Innovation Centers for Advanced Interdisciplinary Research	Creating a Co-mobility Society*
Faculty of Environment and I nformation Studies	Professor	Masataka Watanabe	Strategic Promotion of Science and Technology in Asia	Development of Environmental Resources Management Technology for Sustainable Use of Biomass
Research Institute for Digital Media and Content	Institute Director	Yuichiro Anzai	Encouraging development of Strategic Research Centers	Research Institute for Digital Media and Content, Keio University

New Subjects Selected in 2008

Affiliation	Position	Research Representative	Program	Research Theme
Faculty of Nursing and Medical Care	Professor	Kaeko Yamashita	Developing Models for Supporting Female Researchers	Project for Developing Social Capital and a Good Working Environment for Women Researchers*
School of Medicine	Professor	Toshio Suda	Improvement of Research Environment for Young Researchers	Career development program for young investigators in "Cell and Metabolis Research" (Keio-Kanrinmaru Project)*
School of Medicine	Associate Professor	Koichi Matsuo	Encouraging innovative and creative young researchers: 2008 academic year	Supporting the PhD Echelons of Medical Students (MEBIOS)*

*The University President has final responsibility for these research projects.

Basic Research Programs

Basic Research Programs are handled by the Japan Science and Technology Agency. In sponsoring these programs, the Agency takes a top-down approach in promoting target-oriented basic research directed toward the achievement of national government objectives. The purpose of these programs is to create the seeds of new technologies for responding to social and industrial needs and generating future scientific and technical innovation. The key persons in these programs are researchers from universities, public agencies, and private corporations, and they carry out research through formation of flexible, mobile cross-organizational research project teams that disband upon completion of the project. This system of directed research programs contrasts with the characteristics of funding for bottom-up scientific research that places a high value on the proposals of individual researchers. From different aspects, these two systems, like the two wheels of a cart, are designed to play a major role in promoting Japan's science and technology. The Japan Science and Technology Agency (JST) establishes specific areas of research, based on the strategic objectives of the Ministry of Education, Culture, Sports, Science and Technology (MEXT). Under the leadership of its research directors, the JST brings together researchers from industry, government and academia, and sets up the most appropriate research organization.

The JST promotes two types of research—open research and JST-supervised research. .

In open research, a research director designated by the JST calls for submission of research proposals in a research area specified by the JST, selects proposals, and promotes the work of the researchers selected. Open research has two types: team research, called CREST (Core Research for Evolutional Science and Technology), and individual research, for path-breaking work to be done by individual scientists.

On the other hand, in supervised research or ERATO (Exploratory Research for Advanced Technology) research targets are based on the unique perspectives of the JST's research directors. Based on these targets, researchers are brought together, and projects are carried out. This type also includes joint research with overseas research organizations.

CREST Research Representatives

Affiliation	Position	Name	Research Theme
School of Medicine	Professor	Toshio Suda	Metabolism in Hematopoietic Stem Cells
School of Medicine	Professor	Hideyuki Saya	Analysis of Abnormal Regulation of Cell Differentiation and Drug Development Research by Using Induced Cancer Stem Cells
School of Medicine	Professor	Akihiko Yoshimura	Reprogramming of Immune System by Modulation of Intracellular Signal Transduction
Faculty of Science and Technology	Professor	Tadahiro Kuroda	Generation of High-performance, Ultra-low-power, Short-range Wireless Mobile Information System
Faculty of Science and Technology	Professor	Hideo Saito	Technology to Display 3D Contents into Free Space
Faculty of Science and Technology	Associate Professor	Kenji Kono	Producing Highly Attack-Resistant Secure Operating Systems
Faculty of Environment and Information Studies	Professor	Hideyuki Tokuda	A Dependable Operating System for Micro Ubiquitous Nodes
Faculty of Environment and Information Studies	Professor	Masaru Tomita	Development of Modeling/Simulation Environment for Systems Biology
Graduate School of Media Design	Professor	Masahiko Inakage	The Research of Ubiquitous Content Production Authoring System

PRESTO Researchers

Affiliation	Position	Name	Research Theme
School of Medicine	Assistant Professor	Motoaki Sano	Metabolomic analysis of heart failure and cardiac senescence
School of Medicine	Associate Professor	Takeshi Miyamoto	Regulation of bone metabolism through osteoclast cell-cell fusion
School of Medicine	Researcher	Kyoko Shirakabe	Physiological Roles and Regulatory Mechanism of Ectodomain in Shedding in Innate Immune Response
Faculty of Science and Technology	Assistant Professor	Eiji Saitoh	Spintronics based on spin currents and spin-photon coupling in dielectrics
Faculty of Science and Technology	Research Associate	Akinobu Yamaguchi	Study in novel electromagnetic properties of modulated and/or periodic magnetic strucure composed of nanoscale magnets
Faculty of Environment and Information Studies	Assistant Professor	Yasuaki Kakehi	Creation of Real World Oriented Interactive Media for Artistic Expression
Graduate School of Media and Governance	Associate Professor	Yasushi Ishihama	Development of ultramicro-electrospray ionization approaches for -omics research

SORST Researchers

Affiliation	Position	Name	Research Theme
School of Medicine	Professor	Hideyuki Okano	Nerve Regeneration Strategy Based on Endogenous Neural Stem Cell Activation
Faculty of Science and Technology	Professor	Yasuhiro Koike	Photonics Polymers for Fiber To The Display
Faculty of Pharmacy	Professor	Takeshi Sugai	Synthesis and Utilization of Heterochiral Synthons based on Biocatalytic Transformations

*Japan Science and Technology Agency (JST): From the Basic Research Programs website http://www.jst.go.jp/kisoken/ *The list above shows research themes continuing since FY2008.
*Solution-Oriented Research for Science and Technology (SORST) refers to a project that has completed its initial period of examination under the Basic Research Programs and has been continued because it has been regarder as having great potential for future benefits.

Grants-in-Aid for Scientific Research (*Kakenhi*)

Kakenhi or grants-in-aid from the Ministry of Ministry of Education, Culture, Sports, Science and Technology (MEXT), are subsidies for research in all areas of inquiry, from the humanities and social sciences to the natural sciences. Grant money is given to various kinds of academic research, from basic to applied. From research based on the free, inventive thinking of researchers, the grants aim to generate results that will bring about social breakthroughs. Over the years, many research projects done with these grants have achieved results of the highest order and have received worldwide recognition, from Nobel Prizes to other awards for scientific endeavor given in Japan and overseas.

The program makes use of approximately six thousand judges to conduct peer review of the proposals submitted. Projects chosen every year are of all kinds, from those in the incubation stage to those at the cutting edge in their field. The *Kakenhi* program represents approximately 5% of the government's total expenses related to science and technology and 40% of the government's total budget for competitive research funds.

The number of applications submitted in FY2008 was about 137,000 (about 15,781 more than in FY2007). Among these about 57,000 applications (about 7,575 more than in FY2007) qualified for research funding, and the total amount (of direct expenses) was about 155, 800 million yen. The table shows the number of projects of the top twenty institutions receiving grant money (new and those continuing from the previous year) in FY2008 and the total amount distributed. The amount received by the top 10 institutions represents 46% of the total amount distributed. In FY2008 Keio University ranked 12th overall and 1st among private institutions.

FY2008 *Kakenhi* Distributed by Institution

Rank	Institution	Number of Projects	Amount (Million yen)
1	University of Tokyo	2,896	21,324
2	Kyoto University	2,304	14,402
3	Tohoku University	1,952	11,074
4	Osaka University	1,941	10,359
5	Kyushu University	1,396	5,728
6	Nagoya University	1,351	6,513
7	Hokkaido University	1,310	6,176
8	University of Tsukuba	911	3,167
9	Hiroshima University	811	2,623
10	Kobe University	751	2,716
11	Tokyo Institute of Technology	701	4,907
12	Keio University	671	2,476
13	RIKEN	630	3,885
14	Chiba University	606	1,843
15	Okayama University	606	2,022
16	Waseda University	572	2,154
17	Kanazawa University	537	1,568
18	Kumamoto University	446	1,536
19	Niigata University	428	1,129
20	Tokyo Medical and Dental University	405	1,825
A			190,644
B			84,082
B/A			44%
C			107,427
C/A			56%

A: Total amount distributed (research expenses) B: Total of top 10 institutions C: Total of top 20 institutions
Source: Japan Society for the Promotion of Science, http://www.jsps.go.jp/j-grantsinaid/
* The distribution amount includes direct and indirect expenses.
* Figures of 100,000 yen and below are rounded off.
* Data here is classified by the research institution with which the research representative is affiliated; it may not reflect the overall ranking by institution.

Center for Human Metabolomic Systems Biology

Program Leader: Makoto Suematsu (Professor, Graduate School of Medicine)
http://www.gcoe-metabo.keio.ac.jp/

Graduate School that Uses English as Official Language
According to agreement (conforming to Bologna Agreement operated in EU countries) with our overseas partner institution, the Karolinska Institute, we have executed all lectures of the graduate school to held in English since 2008. We also held 17 GCOE-related seminars by inviting outstanding researchers from inside and outside the school.

Summer School in Partnership with Karolinska Institute and Boston University
The summer school, held for five weeks in July, 2008, differed from conventional exchange programs based on individual labs or professors. It was a representative program of 2008, officially organized by between Keio University's GCOE and Karolinska Institute, a member of EATRIS (EU equivalent to the GCOE program). The Summer School consisted of one week of intensive lectures and four weeks of lab work. A total of six lecturers were invited from the Karolinska Institute and Boston University. We gave course credits for the first time to six doctoral students from the Karolinska Institute who attended. We are also planning to organize Winter School 2009 at the Karolinska Institute at the end of FY2009.

Student Evaluation Using RA Point System
We established the subject "Metabolomic Systems Biology" (2 units) as an official graduate school secondary course whose credit can be earned if a research assistant (RA) obtains 30 points or more in a year. This subject is required of all GCOE RAs. In "Metabolomic Systems Biology," along with learning about metabolism of energy based on the bioavailability of the components of an organism, students also learn integrative techniques to solve problems, using biosimulation and computer sciences to efficiently process biological informatics, including genomics, proteomics, and metabolomics.

Fostering Independent Young Researchers
We are actively obtaining competitive external grants to create an environment that fosters independent research and trains young researchers. At the same time, in our routine efforts we appoint exclusive instructors for our shared-use research facilities.


Summer School in partnership with Karolinska Institute and Boston University (July 2008)

Strengthening Shared Laboratory Functions
We have established a division that serves as the gate window to researchers around the world for using technologies and animal resources developed by this GCOE program (Such resources and facilities include, two-photon laser scanning microscopy to analyze, cerebrovascular circulation and energy metabolism or biological behavior of water circulation, mass spectrometric imaging and HAL: Humanized Animal Laboratory.)

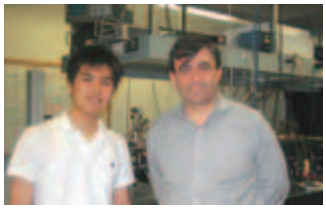
Groundbreaking Metabolomic Systems Biology Thanks to Development of Leading-Edge Mass Spectrographic Technology
We began building a high-spatial resolution mass spectrometric imaging system as a key technology to perform quantitative analysis of metabolites in specific regions of the cell and to identify low-molecular compounds. We have recently built the technology for mapping nucleotide metabolism during cerebral ischemia. Also, by using the multi-function multi-photon microscope in connection with real-time monitoring of energy metabolism, blood flow, and oxygenation in solid organs such as the brain and liver, we are supporting the *in vivo* study of cellular and molecular dynamics and analysis of metabolic functions. To understand the global picture of the regulation of metabolomic systems, we will create technologies to search for the receptors of lowmolecular metabolites using affinity nano-beads, and to identify receptors of extremely small molecules, such as gas molecules, in combination with using mass spectrometry.

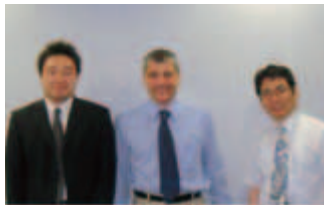
High-Level Global Cooperation for Leading-Edge Platform on Access Spaces

Program Leader: Kouhei Ohnishi (Professor, Graduate School of Science and Technology)
http://www.gcoee.keio.ac.jp/

This GCOE Program, began in 2007, is proceeding in creating an outstanding international research and education center that produces scientists and engineers having rich humanity and the skills of actively working in the international arena. On the research front, we are pursuing new human-centered science and technology in order to provide digital support that meets the needs of individual activities. We have established targets having levels of higher performance than those based on the conventional information, electrical and electronic technologies, and we are making progress on coordinated research that integrates areas from photonic/electronic devices to network communication and haptics. Specifically, to provide advanced human support in access spaces, we are pursuing research that heightens synergistic achievements in the following four fields: "Basic engineering physics for innovative photonic/electronic device creation," "Environment-embedded device technology," "Real-world and real-time network for multi-dimensional processing and communication", and "Perception and expression technology."
Concerning the human development, as of 2008 we have employed 55 COE research assistants (RAs) who are registered as doctoral students and 10 post-doctoral (PDs) researchers under the competitive scheme.
Along with being tasked to learn the COE subjects prepared in the Graduate School, the RAs can also make use of double-degree programs, a double supervisor system (that includes professors at the overseas core partners and collaborators), international internships and overseas joint researches. As a result, we will be able to establish career paths for young PhD-holding scientists and engineers that allow them to participate actively in the international arena. We also expect to produce new leaders who can be active in the global society.

Achievements in FY2008
(1) Strengthening international cooperative centers network,
NOE (Network of Excellence)
We signed three new memorandums of agreement, including the University of Western Australia, to increase to 39 international partner institutions.
(2) International workshops
We sponsored ten international workshops at the collaborators, such as Imperial College (UK) and Technische Universität München (Germany), and the total participants were 314 persons.
(3) Internship program
Four students for long-term internships and six for short-term internships were sent to the overseas collaborators (including Harvard University, Ecole Centrale de Nantes, and Ghent University) to carry out the joint researches on nanotechnology, augmented reality (AR), and network technology.
(4) Double supervisor system
Four students obtained their degrees from the supervision of professors at the overseas collaborators (such as the University of California, Berkeley and Università degli Studi di Padova).
(5) Distinguished COE-RA system
Three outstanding students were recognized and given awards.
(6) Educational programs
We held the "Leading-Edge Science and Technology" seminar and a lecture on "Ethics and Copyrights in Science and Technology." We also had 33 special lectures by prominent researchers for RAs and young researchers, and a winter camp organized by the RAs themselves.
(7) Presentation of the achievements to society
To present the achievements of our GCOE program to society, we held several events in which young researchers presented their research results, such as the Keio TECHNO-MALL (December 2008), a PhD paper contest (RA poster session, March 2009) and the GCOE symposium (March 2009).
(8) Research achievements
We are solidly producing results, with 169 journal papers, 31 invited talks, and 280 presentations at international conferences.


Internship at Harvard University


Obtaining the degree under the double supervisor system (professors at the collaborators as the second reader)

Centre for Advanced Research on Logic and Sensibility

Program Leader: Shigeru Watanabe (Professor, Graduate School of Human Relations)
http://www.carls.keio.ac.jp/english/

The Centre for Advanced Research on Logic and Sensibility (CARLS) is a program for the education and research of logic and sensibility. To accomplish this purpose, it has a well-designed educational program in close collaboration with the Graduate School of Human Relations. Several research facilities and a program for promotion of publication of research results support the CARLS.

Educational and Research Programs
We have five education and research teams: Brain and Evolution, Genetics and Development, Language and Cognition, Philosophy and Anthropology and Logic and Informatics. The teams carry out leading-edge research on logic and sensibility from different points of view and graduate students participate in the research through official courses of the graduate program. They learn how to run interdisciplinary research through this participation. Ten students obtained certificates of completion of the program in 2007 and nine students in 2008.

Educational and Research facilities
CARLS is equipped with several advanced facilities for integrative research with experimental sciences. An MRI laboratory was started in 2008 and 20 research projects are now running. A developmental laboratory has NIRS and TOBII. We have also a marmoset laboratory in Research Park in the School of Medicine and a field station in Tsukuba City.

Program for promotion of publication of research
To facilitate international presentations of research results for young scientists, we are providing assistance for writing in English. Through this program, young scientists published 51 English papers in 2008.

Domestic collaboration
We collaborate with the Symbolic Cognitive Development Team at RIKEN BSI and carry out joint research with marmosets. Students at Keio University also run experiments in RIKEN BSI.

International collaboration
We collaborate with several world-class institutes in foreign countries. In 2008, we have concluded agreements on collaboration with the University of South Florida in the USA and Gachon University in South Korea. In 2009, we have made an agreement on collaboration with McGill University in Canada. We plan to collaborate with around 15 international institutes.

International Education and Research Program
We have international seminars for young scientists. A Keio-Cambridge seminar and a Keio-Gachon seminar are regularly held in the UK and South Korea, respectively. In 2009, we will start a similar seminar with the University of South Florida in the USA. We are also actively supporting presentations by young scientists at international congresses and meetings.

Publications
We publish "*CARLS Series of Advanced Study of Logic and Sensibility*" each year and newsletters four times a year in addition to English monographs based on our international symposium. We also have lectures for the general public in Japan and frequent press releases.

Networking
We have formed a network with the two other Global COE programs at Keio University and started the Institute of Human Cognition with those programs in 2009. We also created a "Global COE network of mind research" with other four Global COE programs at other universities and had a symposium at the annual meeting of the Japanese Psychological Association in 2009.

Employment and Financial Support for Young Scientists
Currently we employ five research associate professors, six research assistant professors and 15 researchers. We plan to employ around 40 professors and researchers.

External Evaluation Committee
We have established an evaluation committee consisting of outside members to receive evaluation of our activities in not only research and education but also in other operations. In 2008, the committee carried out a review and reported that the program is proceeding efficiently and smoothly.

Education and Research Center for Stem Cell Medicine

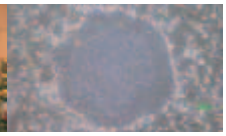
Program Leader: Professor Hideyuki Okano, Graduate School of Medicine
http://www.gcoe-stemcell.keio.ac.jp/

Our Global COE (GCOE) Program, "The Education and Research Center for Stem Cell Medicine," builds on research established by the 21st COE Program "Basic Study and Clinical Application of the Human Stem Cell Biology and Immunology" to create infrastructure for strategically fostering human resources and to create a center for education and research on stem cell medicine. We seek to establish an academic domain around the concept of "stem cell medicine" that incorporates a wide range of fields in medical science. Furthermore, our goal is to foster the next generation of scientists who can become the core of a more international network of stem cell researchers. We do this by fostering the capacity for self-renewal (creating a virtuous cycle of building a series of education and research structures), multipotentiality (cultivating versatile personnel), and migratory ability (exchanging personnel to build an international cooperation framework).
With the following areas/subgroups, our GCOE Program seeks to implement clinical applications of regenerative medicine from basic research:
1. Regulation of tissue stem cell and in vivo experimental medicine
2. Inflammation/immunological control and tissue regeneration
3. Development of diagnostic and therapeutic methods targeting cancer stem cells and epithelial mesenchymal transition in patients with cancer
4. Development of regenerative medicine for intractable diseases
5. Practical implementation of feasible regenerative medicine
We are advancing our research with close cooperation among these subgroups.
In 2008, the start of the GCOE program, we succeeded in transplanting neural precursor cells derived from mouse induced pluripotent stem cells (iPS cells) to model animals with spinal cord injuries (thoracic cord injury model) and restoring motor functions. This achievement was widely reported in newspapers and other mass media. In addition, we succeeded in inducing myocardial cells from human iPS cells, in establishing iPS cells from patients with familial Parkinson's disease, and in establishing a highly efficient and high-quality process of inducing iPS cells using highly pure mouse and human mesenchymal stem cells (MSCs). We have been able to make a variety of progress in the field of iPS cell research, which has drawn attention in recent years. Each subgroup of the program has reported research achievements one after another, such as: the elucidation of the molecular basis for each type of stress tolerance of hematopoietic stem cells using FOX03ai; establishing a method of purifying spermatogenic cells and discovering differentiation control abnormalities through response abnormalities to genetically damaged spermatogenic cells; elucidation of control mechanism using the PI3K pathway, which expresses inflammatory cytokine in dendritic cells; building a model of listeria encephalopathy and analyzing the immune system within the brain; discovery of the promotion and inhibition of cancer cell metastasis mediated by immune suppression using epithelial-mesenchymal transition (EMT) of cancer cells; *in vivo* analysis of the cell cycle through production of transgenic killifish expressing GFP-histone H2B; transplantation of human ES-induced myocardial cells to super-immunodeficient mice; studying the possibility of transplanting neural crest stem cells to treat Hirschsprung's disease; and elucidation of neural crest stem cells derived from bone marrow, dorsal root ganglion, and facial skin.
For activities related to education and international exchange, we held events such as the international symposium "The Forefront of Regenerative Medicine" (Jan. 1, 2009); the 5th Keio University Advanced Science and Technology Symposium, commemorating the 150th anniversary of Keio University, entitled, "Groundbreaking iPS: The Future of Medical Research" (backed by this GCOE program and featuring four subgroup leaders as speakers) (Feb. 4, 2009); the 17th GCOE Seminar; and the COEX Meeting (as of March 2009, the 61st meeting since the start of the 21st COE Program in October 2003). These events provided valuable experiences to young researchers and graduate students belonging to our GCOE program. We are off to an excellent start this year, the first year of the GCOE program, with unusually abundant results. Based on such achievements, we plan to further enrich and deepen our research and education in the coming years.

Main Events of 2009
Stem Cell Symposium
(May 15-16, 2009, co-sponsored by the center, at Izumi Garden Gallery)
GCOE Workshop to Improve Presentation Skill 2009
(June 18-25, 2009, at Shinomachi campus)
GCOE Summer School 2009 KeioxLund
(August 3-4, 2009, at Shinomachi campus)


Young researchers receiving guidance from Dr. George Q. Daley (Jan. 1, 2008 symposium)


Dr. Hideyuki Okano lecturing at the symposium "Groundbreaking iPS: The Future of Medical Research"


Human iPS stem cell colony

Center for Education and Research of Symbiotic, Safe and Secure System Design

Program Leader: Professor Takashi Maeno, Graduate School of System Design and Management
http://www.gcoe-s4design.keio.ac.jp/en/index.html

The Center for Education and Research of Symbiotic, Safe and Secure System Design is developing leaders for the age of globalization who have both basic skills and comprehensive ability by giving full play to the global top-level achievements in basic scholarship at the Graduate School of Science and Technology and the strength of original approaches to system design management education of highly skilled professionals (mainly working people) at the Graduate School of System Design and Management, which was newly established in 2008. Last fiscal year in its inaugural year, the Center implemented a system design organization that satisfies the goals of both large-scale system design and diverse values such as the environment and safety. The Center has begun discussions and information exchanges on the theory of symbiotic and safe system design and, at the same time, initiated specific education and research on symbiotic and safe system design.

1. Symbiotic and safe system design education
The Center has implemented an international collaborative course system comprised of "Basis for System Design and Management," "Design Project (ALPS: Active Learning Program Sequence)," "Safe System Design," "Requirement Engineering," "System Architecting," "System Integration," and "Complex System Design" in parallel with international, collaborative practical education for young researchers. In cooperation with Massachusetts Institute of Technology and Stanford University, the "Design Project (ALPS)" course explores major themes, such as "sustainable community," in which students in groups not only work on problem establishment and solution concepts, they give concrete shape to and verify their concepts. Students not only acquire professional ability and system design ability, they gain a broad range of skills from leadership and teamwork to presentation and an international way of thinking. To consolidate symbiotic and safe system design education, the Center has established various support systems such as economic assistance, research guidance, internship, and a voluntary student organization.

2. Symbiotic and safe system design research
The Center has two pillars of research.
(1) Research related to educational systems for symbiotic and safe system design
Based on collaboration between COE members in Japan and overseas, the Center has advanced tangible joint research related to new methodology for system design education. Specifically, research has begun on educational achievements and issues centered on the Design Project (ALPS) comprised of international collaborative lectures, including lively international cooperation and discussions.
(2) Research related to symbiotic and safe system design
To conduct symbiotic and safe system design research in areas from energy to mobility, the Center has implemented a system design research framework—that is symbiotic and safe, large-scale, and complex—as a pillar to support methodology, modeling, simulation, energy systems, mobility systems, and human systems. Collaboration based research has already begun.

3. Clarification of assessment scale
The Center has established an assessment board comprised of outside experts from the business world. The board has begun to conduct external assessments of the Center's education and research achievements. The main comment from board members is that while the Center has original, outstanding education and research that meet the demands of society, the Center's achievements need to be more aggressively disseminated to the outside. Going forward, the Center needs to actively communicate information about its achievements to the outside. To quantify the educational effect, the Center has begun to conduct questionnaire surveys of students. COE members have also begun self-assessment and improvement activities. As described above, in addition to a good quantifiable assessment scale, the Center has implemented a system that can quantify the return of education and research achievements to society and students. Looking ahead, the Center asks for support and cooperation from within and without Keio University in this education and research endeavor.

Raising Market Quality – Integrated Design of "Market Infrastructure"

Program Leader: Professor Naoyuki Yoshino, Graduate School of Economics
http://www.coe-econbus.keio.ac.jp/

1. Subprime mortgage loan crisis and the low quality of the market
Many Economic issues in these days seem to be based on the low quality of market such as sub-prime housing loan problem. This year's research focuses on how to improve the financial market in the world so as not to cause another financial crisis. The Global COE of "Raising Market Quality" had forum and panel discussions not only our research members but also inviting policy makers from the Ministry of Finance, the Central Bank of Japan. It is published as a book titled "*Debate: Sub-prime Loan Financial Crisis*" (Keio University Press, 2009). Market infrastructure such as laws, regulations, credit rating agency, investment banks, insurance companies etc. which created sub-prime loan financial crisis has to be improved. Market infrastructure has to be up-graded.

2. Research on Market Quality by use of Households' Panel Data
Keio Households' data collects Japan's households behavior every year. Based on continuous annual households' survey data allows us to examine the impact of current financial crisis on Japanese labor supply, housing investment behavior, and households' allocation of financial assets. Keio University-Kyoto University Global COE started to exchange households' data with Princeton University (USA) and Erasmus University (Netherland).

3. Current Financial Crisis and the improvement of the quality of the Asian Financial Market
Asian Economic Panel (AEP) Meeting is held every year to discuss how to upgrade the various markets including financial market in Asia. KIEP (Korea Institute of Economic Policy), Columbia University (USA), Thammasat University, University of Indonesia, University of Malaya, University of Philippines, University of Hong Kong, Swedish Institute, Australian National University and Former Finance Minister of Thailand, Former Deputy Governor of Bank Indonesia are members of AEP Meeting. Best papers from the AEP meeting are published from MIT press every year.

4. Market Quality Research on in the field of History and Theory
The market quality research is applied to the field of history and economic theory. Such historical research as the Shanghai electric power market at the beginning of the 20th century, the human excrement market in the prewar period of Tokyo, the railway crosstie market in the prewar period, the fertilizer market in colonial Taiwan, and the hot spring resource management in modern Japan are examples of the application of market quality research on historical analysis. Market quality research in economic theory was initiated by Professor Makoto Yano and it is applied to the subprime loan market. The Global COE has developed a new bargaining theory introduced for price competition which is related to the fairness of the business practice.

5. Graduate School Education in Market Quality
Three basic subjects on market quality had been established as GCOE (Global COE) through collaborative cooperation between Keio University and Kyoto University. Three courses provide a variety of attractive lectures, such as 1) The theory of economic dynamics to raise market quality, 2) Panel data design, analysis, theory, and 3) Market infrastructure design applicable to economic policy making. Further, the GCOE offers a basic course work to write doctoral dissertations. The course covers how to set up the topic of the thesis, how to real related literature, dissertation structure, and presentation techniques. Graduate School education is aimed to improve quality of the PhD thesis and increase the number of graduate students to complete their PhD theses.


Global COE research presentation

Center of Governance for Civil Society (Designing Governance for Civil Society)

Program Leader: Professor Yoshihisa Hagiwara, Graduate School of Law
http://www.cgcs.keio.ac.jp/

The Center of Governance for Civil Society (CGCS)—selected as a Global COE in 2008 by the Ministry of Education, Culture, Sports, Science and Technology—conducts world class education and research on "governance for civil society" not only in Japan, but in collaboration with centers in the US, Asian, and other overseas countries. The CGCS educates and trains young researchers to enable them to become active internationally. To achieve this objective, the CGCS has established the following research activities in line with the COE Implementation Plan.

The establishment of the CGCS

The Center of Governance for Civil Society (CGCS) was launched in August 2008 after recruiting young researchers widely from Japan and overseas for each educational and research unit.

Attitude survey on governance for civil society

- The CGCS conducted a large-scale attitude survey (1st NV panel survey) targeting voters in Japan, the US, and South Korea. At the same time, it collected, recorded, and analyzed media information between the policy elites and the government.
- At the local government level nationwide, the CGCS conducted a large-scale citizen attitude survey (1st LV panel survey) targeting voters/residents and a large-scale attitude survey (1st LE panel survey) targeting the policy elites. In addition, the CGCS analyzed election bulletins of Upper House elections, organized the database of National Diet minutes (Lower House and Upper House) by speaker, digitalized the content of election bulletins and made a database of that content, and also a database of the election bulletins of local assembly candidates.
- The CGCS also made it possible to enter new information into the data archive and replaced server computers.

International collaborations

The CGCS has collaborated with its overseas partners and other educational research centers.

- The CGCS collaborates with the University of California, Berkeley (USA). Young researchers have gone on internships at the Institute of Governmental Studies for joint research and survey collection related to research on governance for civil society.
- The CGCS collaborates with Inha University (South Korea). Young researchers specializing in governance for civil society were invited to the CGCS to participate in an international academic exchange conference.
- The CGCS collaborates with Yonsei University (South Korea). An International Symposium for Young Research Fellows was held in Seoul. The CGCS and Seoul National University (South Korea) held a total of three International Academic Exchange Conferences (with a total of 46 reports).
- In collaboration with Yonsei University, Seoul National University, and Uppsala University (Sweden), the CGCS held a total of three International Symposia for Young Research Fellows (with a total of 20 reports).

The CGCS will continue to build and strengthen this international network of collaboration. This Global COE is expected to become an educational and research center for governance recognized worldwide—a center that trains young researchers to excel.

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International activities

While giving full play to international collaboration as described above, the CGCS has disseminated those research achievements in Japan and overseas through the following international activities.

- The CGCS held its 1st International Symposium on Designing Governance for Civil Society. The Symposium had 77 speakers and 46 research reports all in English. In all, there were 346 participants from Japan and overseas.
- In addition to sponsoring various symposiums and conferences, the CGCS has supported graduate students and young researchers to give papers in the US, the UK, South Korea, China, and other countries (for a total of 16 reports).
- Towards becoming a hub of international research discussion related to governance for civil society, the CGCS has published the 10th issue of the *Journal of Political Science and Sociology* (available at 210 universities in Japan and overseas), a refereed journal with articles written mainly in English.

The achievements of the joint research activities between this Global COE and research collaborators in Japan and overseas are currently being prepared for publication as a compilation of monographs in English.

Project for Developing Social Capital and a Good Working Environment for Women Researchers

Project Leader: Kaeko Yamashita (Director of Work-Life Balance Research Center and Professor of Faculty of Nursing and Medical Care) http://www.wlb.keio.ac.jp/

* The general director of this project is the president of Keio University.

By providing women researchers with a way to reconcile research with life events—such as childbirth and child-rearing—and by conceptualizing, planning, and implementing a series of support measures to enable women to continue a career as a researcher, the "Project for Developing Social Capital and a Good Working Environment for Women Researchers" aims to build a campus environment infrastructure that enables the continuation of research and education activities.

One feature of this Project is the effort under way to create a new movement with university-wide cooperation through the maximum utilization of social capital built up over the years.

Centered on the "Work-Life Balance Research Center" established in February 2008, the Project has implemented support measures in the following four categories.

1. Development of promotion organization

In March 2009, the "Office for Promotion of Gender Equality" was established to advance not only childbirth and child-rearing support, but various other needs university-wide such as home-care support. To enable women researchers to continue research activities under any circumstances, the "Research Support Program" was implemented to hire research assistants. These programs contributed, for instance, to four presentations at international conferences. In addition, an information support environment—making use of information and communication technology—has been developed and includes a web-conferencing system.

2. Childcare support

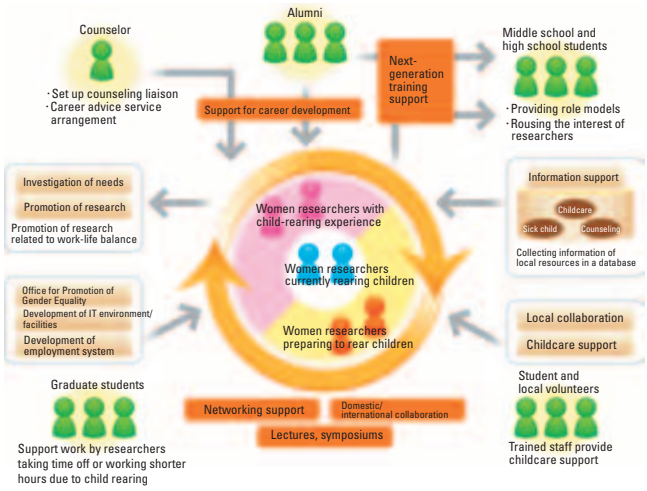
A "childcare supporter training program" was launched to provide temporary and flexible childcare support using on-campus facilities. A total of 15 students have signed up after receiving a certificate of childcare support supervised by the Center. The Center and NPO Florence have begun joint development of a sick child care service for university and research organizations. A trial service was launched from December 2008. In addition, a database of childcare and local resources has been created and an information service has been launched.

3. Empowerment support

Support needs are diverse. In FY2008, the campus working-groups held five workshops at the campuses so that researchers could exchange information and broaden their human network. In February 2009, the first symposium on "Support for Women Researchers and Promotion of Gender Equality at Keio" was held to draw attention inside and outside Keio to the efforts underway at the Center.

4. Promotion of investigation and research

The Center has conducted a survey on work-life balance and promotion of gender equality among full-time academic staff at Keio University. This survey shed light on specific problems and needs related to child rearing, home-care, and other life balance areas. The survey results were published on the Center's website. Going forward, the Center will effectively utilize the knowledge gained through these efforts to explore policies that will contribute to gender equality across all campuses.



Support for forming a community of women researchers

Special Coordination Fund for the Promotion of Science and Technology [Improvement of research environment for young researchers] FY2008

Career development program for young investigators in "Cell and Metabolism Research" (Keio-Kanrinmaru Project)

* The university president has overall authority over this project

Project Leader: Toshio Suda (Professor, School of Medicine) http://www.careerpath-prj.keio.ac.jp/kanrinmaru/english/

This project is funded by the Ministry of Education, Culture, Sports, Science and Technology (MEXT). Its aim is to introduce a tenure track program into Keio university by fostering the next generation of leaders in the basic research of cells and metabolism.
This year, we selected gifted young researchers from all over the world, and in most cases we offered them employment until 2012. By breaking new ground in the creative research of cells and metabolism, we will pave the way towards offering tenure to young researchers who have the capacity to become widely acknowledges as leaders in the field.
We will perform annual performance assessments and mid-term interim assessments, and we will perform tenure reviews based on clear standardized evaluation criteria at the end of this period.
In this way, we intend to carry out a tenure system and evaluation systems for teaching staff, partly introduced into the School of Medicine.
The university president has overall authority over this project, which is managed by a tenure track steering committee as a university-wide organization covering all schools, comprising teaching staff from related faculties situated in KARC Career Development Center. The steering committee is led by Professor Toshio Suda of the School of Medicine.
In this first year of the project, we launched an international appeal for tenure track teaching staff, we screened the applications (the application documents were all prepared in English) and conducted interviews in English. Out of 98 applicants (of whom 21% were female researchers and 11% were from overseas), we employed 3 researchers as associate professors (non-tenured), and a further 10 as assistant professors (non-tenured). In the selection process, the selection committee (including committee members from outside the university) paid particular attention not only to details such as the content of the research proposals, the performance records of the researchers and their record in acquiring competitive research funding, but also to qualities that marked individuals out as young researchers capable of bringing in new techniques and concepts rather than adhering to established research models, and researchers who are not simply a cut above the rest but true leaders in their respective fields of research.
We are actively supporting the 13 successful candidates in their research activities, and we have just about finished setting up their research environments in line with our basic policies of providing targeted research funding and providing personal and material support for existing related laboratories.
Furthermore, we have prepared shared research facilities to promote the formation of an environment where independently-minded researchers can effectively pursue their own studies.

Tenure track teaching staff budgetary allocations, etc.

Associate Professor (Non-tenured)

- Start-up fund of ¥20 million, followed by research funding of ¥3 million for each subsequent year
- Salary payments based on university salary scheme
- Exclusive use of approximately 100 m^2 lab space
- Ability to hire one research assistant (postdoctoral student or technical staff)

Assistant Professor (Non-tenured)

- Start-up fund of ¥10 million, followed by research funding of ¥2 million for each subsequent year
- Salary payments based on university salary scheme
- Lab space provided in the university laboratories

Successful tenure track applicants (random order)

Name	Research theme
Takeshi Miyamoto *Associate Professor (Non-tenured)*	Regulation of Bone Homeostasis by Osteoclast cell-cell Fusion and Aging
Shinji Makino *Associate Professor (Non-tenured)*	Cardiomyocyte niche for cardiac regeneration: Toward an understanding the mechanisms underlying cardiomyocyte proliferation and maintenance
Takashi Kobayashi *Associate Professor (Non-tenured)*	Molecular basis for inflammation by mouse genetic engineering and bioimaging
Giichi Takaesu *Assistant Professor (Non-tenured)*	Physiological and pathological roles of autophagy in mammals and its regulatory mechanisms.
Akiharu Kubo *Assistant Professor (Non-tenured)*	Molecular "Barriology" of the Skin –Unlock the Puzzle of Skin Barrier and Allergic Diseases–
Yohei Okada *Assistant Professor (Non-tenured)*	The analysis of the development of human neural stem/progenitor cells using human ES cells and human iPS cells
Shinsuke Yuasa *Assistant Professor (Non-tenured)*	Direct reprogramming of somatic cells to cardiac myocytes
Yoshiaki Kubota *Assistant Professor (Non-tenured)*	Development of novel tumor-selective anti-angiogenic therapy
Jin Nakahara *Assistant Professor (Non-tenured)*	Translational research for the development of central nervous system remyelination medicine
Shinichiro Nakada *Assistant Professor (Non-tenured)*	The impact of inaccurate DNA damage response on stem cell maintenance, tumorigenesis and senescence.
Itsuki Ajioka *Assistant Professor (Non-tenured)*	Epigenetic Role of Rb during Rod Photoreceptor Differentiation
Keisuke Horiuchi *Assistant Professor (Non-tenured)*	Functional analysis of ectodomain shedding by TACE (TNF converting enzyme, ADAM17)
Tsukasa Oikawa *Assistant Professor (Non-tenured)*	Metabolome/transcriptome analysis of the EMT process for the regulation of cancer cell plasticity

Special Coordination Fund for the Promotion of Science and Technology [Encouraging innovative and creative young researchers] FY2008

Medical Biologist Support (MEBIOS) Training Program

Project Leader: Koichi Matsuo (Associate professor, School of Medicine)
http://www.keio-mebios.com/index.html

* The university president has overall authority over this project

MEBIOS (Medical Biologist Support)

This project aims to support young socially responsible PhD students who are able to respond to society's needs in a broad range of fields centered around medical science, including technology and information science.
We have provided practical programs such as holding open seminars and other professional training courses, and providing internships of at least 3 months by linking up with businesses and research organizations both in Japan and overseas. These are targeted at postdoctoral and Ph.D. students who have qualified for selection within the last five years.
The mission of academia is to allow society to benefit from Ph.D. holders who may achieve outstanding research results but have little opportunity to interact with organizations in the real world such as businesses. At the MEBIOS project, mentors with business experience are designing flexible and detailed programs suited to individual researchers. This project is working its way into the graduate schools of medicine, science and technology, media and governance, and pharmaceutical sciences.

Activities in the 2008 academic year

- Setting up the MEBIOS steering committee and MEBIOS office

As the decision-making body of this program, the MEBIOS steering committee was assembled from teaching staff of various related faculties (chairperson: Professor Koichi Matsuo, School of Medicine). Since July, coordinators and mentors with a thorough knowledge of the business world have been brought in to the MEBIOS office where the program is planned and administered (Shinanomachi Campus, Integrated Medical Research Building, 2nd Floor).

- Selected MEBIOS candidates and MEBIOS members

Ph.D. students that pass selection are hired by the university for between three months and one year, and participate in a program of practical experience.In the early stages, students that are still planning their academic careers are also offered consultations as MEBIOS members. Since this was the first year of the project, we started by selecting 11 postdoctoral researchers, of whom three have commenced employment. We also enrolled 33 MEBIOS members.

- MEBIOS corporate members

As places that will accept internship placements, we have entered into cooperative contracts with businesses and research organizations operating in fields as diverse as drug manufacture, drug discovery, instrumentation manufacture, clinical testing, communications, image processing and publishing. A growing number of member businesses support the aims of this program, and we are also setting up links with new businesses to respond to the demands of researchers taking part in the program.

- Practical program

Internship: By getting involved in joint studies with businesses in the School of Medicine Research Park and with businesses and other organizations in Japan and overseas, the candidates perform on-site training for a total of at least three months in research and development and other duties. This year's three candidates performed internships at two biotech companies and at a 3D image analysis company. One of them completed the program and was employed by the company's research laboratories.
Professional coaching: We also hold courses and open seminars to impart knowledge from diverse specialized fields. This year we held well-attended courses on the basics of intellectual property, a scientific communication course, clinical research basics, and a basic course in career design.
Mentoring system: By inviting experienced business executives to act as mentors, we were able to provide young researchers with individual guidance in regular individual consultations.

- Progress report meetings

At the end of the academic year we held a progress report meeting where the achievements of the candidates were announced. By conducting lectures and panel discussions with business human resource executives and Ph.D. holders working in industry, a wide range of opinions were exchanged regarding the sort of Ph.D. students that businesses actually need.

Professional coaching

Creation of a highly secure OS with advanced attack protection

Research Representative: Kenji Kono (Associate professor, Faculty of Science and Technology)
http://www.crest-os.jst.go.jp/index.html

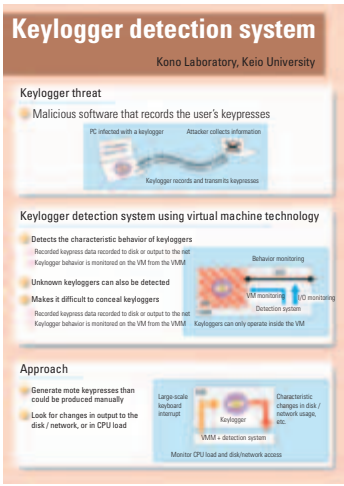
As the Internet develops, services that use it are becoming part of the modern social infrastructure. However, this trend is accompanied by a growing incidence of cases where personal data is lost as a result of illegal cyber attacks launched over the Internet. Due to rapid advances in technologies such as smart phones and consumer electronics, there will soon be many more devices connected to the Internet. It is therefore becoming increasingly important to improve the reliability and security of Internet services. In this project, we aim to create an operating system (OS) that can withstand the growing onslaught of attacks and viruses. Specifically, we are researching and developing a software platform that uses modern technological tools such as virtualization technology and security chips to run Internet services more safely based on a thorough review of the security measures in existing operating systems. We are also investigating the introduction of a dependable OS (DEOS), which is being researched and developed in all these research areas. DEOS is intended to be used in the open environments such as the Internet. With the aim of getting this OS implemented in practice, we are holding frequent meetings with projects at other universities. In 2008 (the first academic year of this project), we researched and developed the core technologies available for the construction of a DEOS safety net using virtualization technology to achieve the aims of this project.

One of our achievements in the 2008 academic year was a keylogger detection system that employs virtualization technology. A keylogger is a piece of software that detects whenever the user touches the keyboard. Once a keylogger has been smuggled into a computer, it can be used to steal private information such as credit card numbers and passwords. Keyloggers are rapidly evolving, and it is becoming difficult to detect them with conventional antivirus software. In this project, we have researched and developed a system that can detect this sort of keylogger. In November 2008, the results of this research were announced at the Xen Summit Asia 2008, which was attended by virtualization technology engineers and researchers from all over the world.

Another achievement is the research and development of a system that analyzes malicious messages sent from Internet servers. In recent years, malicious messages have become harder to analyze due to the use of self-encryption techniques and the like. In this project, we have researched and developed a system that analyzes malicious messages that were difficult to analyze with conventional techniques. The results of this study were announced at a national symposium, and the students that made the announcement received a student paper award. After performing additional research, the results were accepted at the DIMVA 2009 conference which is held in high regard internationally in the field of system security.

Other R&D subjects include a technique for detecting viruses that use so-called rootkits to conceal their presence inside operating systems, and a technique for operating security software efficiently in virtual environments. We learnt a lot from the technology we researched and developed in the 2008 academic year, and in the future we can expect to continue researching and developing software technology.

For the 2009 academic year, we have strengthened our research system. We have established a research space at the university's Shin-Kawasaki Town Campus, where a complete research environment has been set up. We have also increased the project membership by welcoming a new assistant professor, and we have worked towards establishing links with other universities in this field. To achieve the project's aims, we will continue with our efforts in the 2009 academic year.



Analysis of Abnormal Regulation of Cell Differentiation and Drug Development Research by Using Induced Cancer Stem Cells

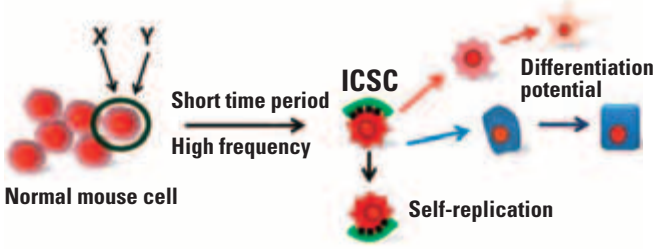
Research Representative: Hideyuki Saya (professor, School of Medicine) Collaborator: Hiroshi Yanagawa (professor, Faculty of Science and Technology)
http://www.ipscc.jst.go.jp/english/index.html

Cells that can adapt to form various different types of body tissue are called tissue stem cells. These cells can not only make copies of themselves (self-replication), but can also produce cells that differ in various ways using themselves as a starting point (differentiation). By constructing a hierarchy of cell communities with these stem cells at the top, we can provide a lifetime's supply of short-lived cells such as blood cells, skin cells and mucosal epithelial cells. It is also known that the proliferation and survival of stem cells are controlled by their extracellular microenvironment (or "niche"). In recent years, it has been conjectured that hierarchies similar to those of normal tissues are also present in cancer tissue, which mimic stem cell systems with regard to their generation and maintenance. The stem cells at the top of these hierarchies are called cancer stem cells.

The concept of cancer stem cells is important because these are cell fractions that exhibit resistance to treatment. It was previously thought that statistical probability was the only factor determining whether or not tumors are left behind after chemotherapy or radiotherapy. However, by introducing the concept of cancer stem cells, it has been shown that the presence of these residue cells can be explained by biological factors. Based on this idea, we need to establish treatments that necessarily take cancer stem cells into consideration. Various new treatment strategies can be considered, such as attacking the cancer stem cells directly, destroying the relationship of the cancer stem cells with the cancer cells in their surrounding microenvironment (niche), or using anticancer drugs to knock out cells as soon as they have turned into precursor cells. To perform treatments such as these, we need to prepare large numbers of cancer stem cells and conduct investigations using drug screening and animal models.

It is known that induced pluripotent stem cells (iPS cells) can be made to appear by manipulating a limited number of genes in order to reprogram differentiated cells. Based on this technique, we performed limited gene manipulation in undifferentiated myelopoietic cells, bone marrow mesenchymal cells and nerve cells of adult mice, and succeeded in producing induced cancer stem cells (iCSC) with perpetual self-replicating potential that could form malignant tumors quickly and in roughly the same period of time in all the mice into which these cells were transplanted. Using iCSC, it is possible to perform in vitro observations of the process whereby normal cells turn into cancer stem cells, the conditions needed for this to happen, the molecular mechanisms that maintain their properties as cancer stem cells, and so on. It also sheds light on molecular interactions that were difficult to discover using the traditional method of excising and analyzing tumors that have grown in vivo.

We will briefly discuss the results of the first academic year that we obtained by using iCSC. First, we introduced the N-myc cancer gene into hematopoietic stem cells/precursor cells and performed bone marrow transplantation, whereupon 100% of the mice developed B-cell lymphomas. We successfully detected cell fractions resistant to treatment in these tumor cell populations. We found that these resistant cells behave like cancer stem cells, and are better at forming tumors than the susceptible cells. We are currently performing a detailed analysis of molecular expression, and we have discovered that slight differences in cell differentiation work as factors separating cells that resist treatment from cells that are susceptible to treatment. In other words, it seems that the discovery of a method for changing the degree of cancer stem cell differentiation will make it possible to increase the possibilities for treatment if resistant cells can be transformed into susceptible cells. In the future we hope to use iCSC to clarify the factors behind non-uniformity in tumor tissue, especially non-uniformity in the response to treatment, and we hope to develop ways of correcting these irregularities.



Producing induced cancer stem cells: By subjecting normal cells to limited genetic manipulations, we can induce cancer stem cells with the ability to self-replicate and differentiate frequently in a short period of time without encountering hyperplasia or genetic instability periods.

Activation and neurogenesis of adult neural stem cells

Research Representative: Hideyuki Okano (Professor, School of Medicine) http://www.okano-lab.com/en/

It has been shown that neural stem cells are present in the adult mammalian brains, where they actively generate neurons. We have taken on the challenge of developing neural regeneration treatments based on the approach of using these newly formed neurons to replenish neurons that have been lost by concussion or neural disease.

To make it possible to generate neurons freely from neural stem cells, we first have to gain a thorough understanding the underlying molecular mechanism of how neural stem cells to differentiate into neurons. We can only do this if we have some way of accurately identifying neural stem cells and neurons.

Immunostaining is a widely used technique for distinguishing different cell types. It works by using antibodies that target marker proteins specific to each of the cell types to be distinguished. However, the immunostaining process often causes significant cell damage, and can impair the quality of RNA that is used as a material for analyzing the state of gene expression. As an alternative to immunostaining, we have investigated a transgenic mouse system for visualizing neural differentiation by combining mouse genetics with fluorescent proteins that have been expanded in recent years to a repertoire that fully covers the visible light region. In this system, as neural stem cells differentiate into neurons, the fluorescence emitted by these cells changes color. This makes it possible to figure out in real time the stage of neural cell differentiation based on the fluorescence color.

As one of the main components of this mouse system (called "Color Timer"). We have produced a transgenic mouse in which the production of *Kusabira*-Orange (KO) fluorescent protein is controlled by the control region of **nestin** genes that are activated in neural stem cells (*nestin*/KO *Tg* mouse). In the adult brain of this mouse, cells emitting strong orange fluorescence were identified in two regions where new neuronal cells are generated— the hippocampal dentate gyrus, and the subventricular zone of the lateral ventricles. We also confirmed that most of these orange cells are *nestin*-positive, and that cells recovered by a cell sorter using orange fluorescence as an indicator exhibited the properties of neural stem cells.

Furthermore, by crossing this *nestin*/KO Tg mouse with a DCX-EGFP Tg mouse that emits green fluorescence from immature neurons, we obtained a double Tg mouse in which it was possible to observe the differentiation of orange neural stem cells into green immature neurons. This "Color Timer" mouse system is expected to become a powerful new tool for clarifying neural cell differentiation mechanisms.

Pursuit of Substances in Dynamic Ecological Systems

Research Representative: Daisuke Uemura (Professor, Faculty of Science and Technology) http://www.bio.keio.ac.jp/labs/uemura/gakujutu/results.html

The discovery of new molecules with novel structures often triggers the development of basic scientific concepts. By searching for molecules focusing on the dynamic ecological systems, we aim to create new fields of biomolecular science by serving important compounds impacting life sciences. All new compounds which we found were subjected to various bioassays and then published in papers. After that, we attempted to promote their application and to make a contribution to the related other fields. In the last year we obtained the following results:

1. Compounds related to symbiotic and parasitic phenomena
We isolated a novel macrolide, luminaolide, that induces settlement and metamorphosis in hermatypic coral larvae. It is hoped that this finding will contribute directly to the environmental conservation of coral reefs.

2. Compound exploration focusing on food chain dynamism and compound function
We determined the stereo structure of symbiodinolide, which is a super-carbon-chain compound (SCC) with a molecular weight of 2,859 obtained from a dinoflagellate, through degradation reactions and synthesis. Symbiodinolide was found to exhibit anti-HIV activity and acute toxicity to mice. Interestingly, symbiodinolide caused flatworms, the host animals, to excrete symbiotic algae. Thus, it was suggested that symbiodinolide acts as a chemical communication molecule between the host and symbiotic organisms. In addition, we discovered a new chemical degradation reaction. This selective degradation reaction may be widely used in the future as an essential technique for determining the structure of SCC. From dinoflagellates, we also discovered symbiospirol A (PKC inhibitor and anti-inflammatory substance) and symbiopolyol (VCAM-1 inhibitor), and we successfully isolated the most huge marine natural product with the molecular weight of 5,148.
As a new method for analyzing the shape of SCC in solutions, we investigated the use of synchrotron radiation X-ray small angle scattering (SAXS) at the SPring-8 facility, and we showed that the horseshoe-like shape as a dimer of palytoxin has an important bearing on the expression of palytoxin activity. This result constitutes an important milestone in the chemical analysis of natural substances using SAXS.

3. Paralytic molecules originating from terrestrial animal, and clarification of their functions
In collaboration with the University of New South Wales and Taronga zoo in Australia, we obtained fresh venom samples of duck-billed platypus, and successfully isolated the constituent that exhibits kallikrein-like protease activity and Ca^{2+} influx in human neuroblasts. Using MS/MS analysis, we discovered six new peptides corresponding to the pre-sequence and N-terminus of C-type natriuretic peptide (CNP). Since there have been no mammalian Ca^{2+} channel agonists reported to date, it is expected that this discovery will lead to the development of new anesthetics and analgesics. Another mammalian toxin source is the short-tailed shrew (*Blarina*), whose submandibular gland containing a fatally toxic protein called blarina toxin (BLTX). In addition to this finding, we could resolve the long-standing question of the mammalian toxins. We have also revealed that a paralytic molecule derived from the hunter wasp was a protein similar to arginine kinase.

4. Comprehensive evaluation of biological activities
By linking up with co-researchers and contract research companies in Japan and overseas, we have evaluated the biological activities of various compounds that we have acquired. In addition to the compounds mentioned above, we have discovered novel PKC activator complanine, derived from *Chloeia flava*, and the novel anti-tumor compound, halichonine C, derived from *Halichondria okadai*.

Discovery of gas-responsive regulatory mechanisms in biological systems: Multidisciplinary approaches and their application to medicine

Research Representative: Makoto Suematsu (Professor, School of Medicine) http://www.gasbiology.com/home/english/index.html

In the 2008 academic year we made great progress in mining novel gas receptor systems by using metabolome analysis technology. We also used nano-bead technology to perform systematic exploration of macro molecules with gas accepting capacity. As a result, we found that heme is able to bind reversibly to the rate-determining enzyme of major metabolic pathways that do not possess heme binding motifs, and that there are many co-sensing molecules that regulate metabolic systems as a whole. CO gas is produced by stress-inducible heme oxygenase-1 (HO-1), an enzyme that produces CO in various cells under stress conditions. The first techniques for the systematic investigation of gas receptor proteins have not only been established, but the characteristics of gas molecules have also been clarified by showing that very slight structural differences triggered by the gas binding can cause dramatic changes in macromolecular function. In a recent study, an investigation using metabolome analysis identified cystathionine β-synthase (CBS) as a new receptor for stress-induced CO gas, demonstrating that the gas controls metabolic systems by means of multicentric suppression for different metabolic pathways.

On the other hand, the structural enzyme heme oxygenase-2 (HO-2) that produces CO is regarded as an intriguing oxygen sensor because when the concentration of molecular oxygen (the substrate) decreases, the generation of CO undergoes a corresponding decrease. The brain produces large quantities of CO. Our findings have shown that in the cerebellum where HO-2 and CBS are expressed abundantly, the neurons become CO generation sources. Meanwhile the astrocytes express co-inhibitable CBS, suggesting that the generation of H_2S generated by this enzyme is suppressed. It has been shown that CO is a gas mediator that regulates microvascular tone of the brain by controlling the metabolism of local neurovascular units. We are currently examining a hypothesis that hypoxic vasodilation is operated by neuronal CO (HO-2) and astrocyte CBS to control local blood flow.

Research Funds at Keio University in FY2008

Research funds at Keio University from national and local public institutions, private businesses, and university funding totaled approximately ¥17.2 billion in FY2008.
The charts below show research fund totals classified in various ways, such as by type of fund, by type of external entity making the contribution, by campus, by researcher affiliation, by research field.

1. Research Funds by Type

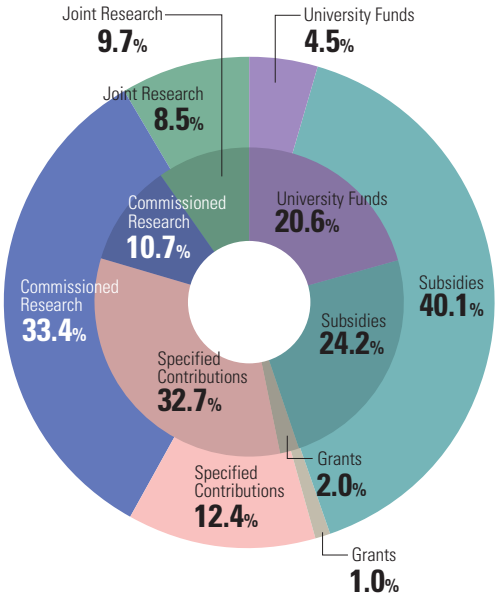
When classifying by type of research funds, specified contributions account for the largest number of projects and subsidies account for the largest amount in yen.
University funds represent less than 5% of the total at 800 million yen. Research funds from external entities represent nearly 95% of the total at 16.4 billion yen.

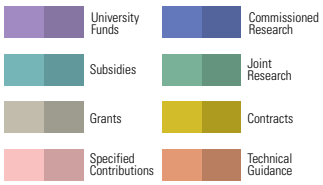
*The total for university funds includes a contribution from the Current Expense Subsidies for Private Universities.
- Special expenses for graduate school education and advanced graduate school support menu group
- Local contribution support menu and regional joint research support as knowledge bases
- Improvement project for high technology research center/Science frontier program/Community collaboration program/Improvement project for open research center
- Creation and support of a base for strategic research at private universities

Thousand yen

Type of Funds	Number of Projects	Amount
University Funds	749	781,824
Subsidies	878	6,910,061
Grants	71	166,903
Specified Contributions	1,189	2,142,860
Commissioned Research	389	5,762,275
Joint Research	351	1,466,307
Contracts	1	290
Technical Guidance	3	1,702
Total	**3,631**	**17,232,222**

Research Funding Share by Type
(Amount (outer ring), Number of Projects (inner ring))





Definition

Subsidies:
Research funds provided mainly by government and their public offices.

Grants:
Research expenses provided mainly by foundations for the purpose of improvement or accomplishment of research.

Specified Contributions:
Contributions earmarked for research activities.

Commissioned Research:
Research commissioned by government and other public offices, as well as private enterprises.

Joint Research:
Collaborative research through personnel exchanges and/or sharing technology/facilities under the joint research agreement, with or without payment of research funds.

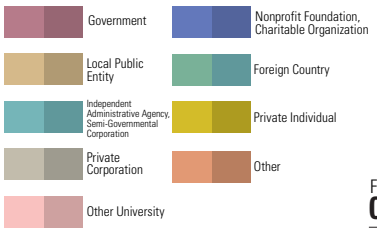
Contracts:
Research under a contract agreement.

Technical Guidance:
Research involving technical guidance such as development of equipment or apparatus.

2. Type of External Entity Contributing Research Funds

This category classifies funds by the type of external entity making the contribution. Private corporation account for the largest number of projects while the government account for the largest amount in yen.

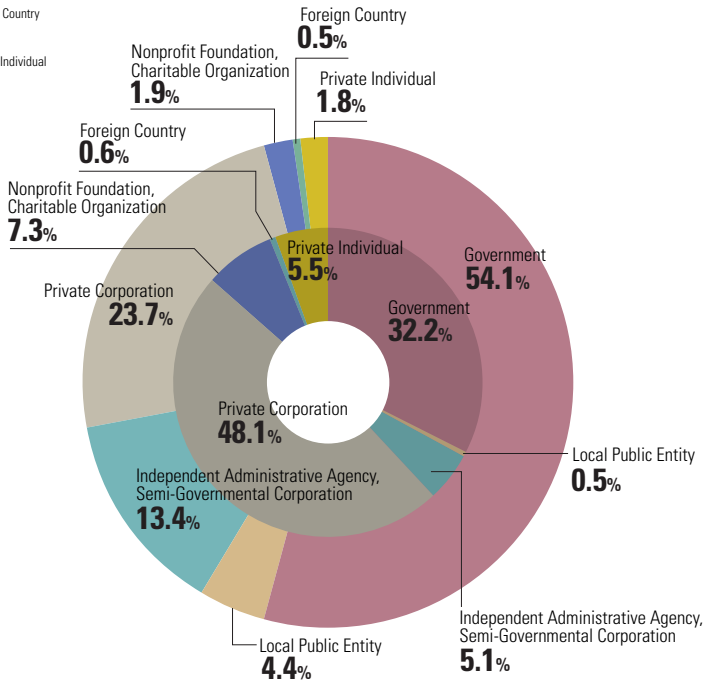
*This chart represents the total number of projects and amount in yen excluding the "University Funds" item in "1. Research Funds by Type."



Thousand yen

Type of External Entity	Number of Projects	Amount
Government	928	8,896,665
Local Public Entity	15	721,198
Independent Administrative Agency, Semi-Governmental Corporation	147	2,206,746
Private Corporation	1,386	3,895,420
Other University	10	7,776
Nonprofit Foundation, Charitable Organization	211	314,203
Foreign Country	17	83,570
Private Individual	159	297,154
Other	9	27,666
Total	**2,882**	**16,450,398**

Contribution Share by External Entity Type
Amount (outer ring), Number of Projects (inner ring))



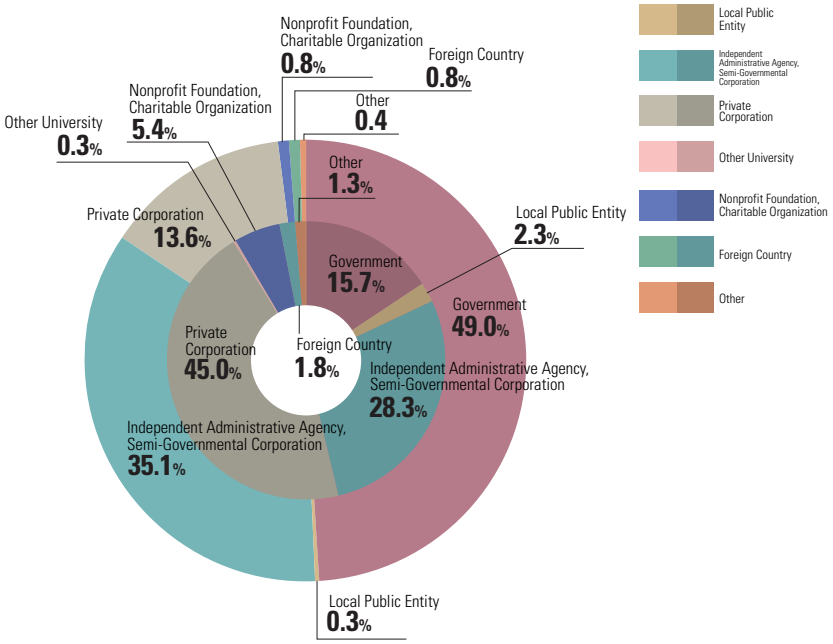
Commissioned Research Expenses by External Entity Type

Thousand yen

Type of External Entity	Number of Projects	Amount
Government	61	2,828,470
Local Public Entity	9	16,093
Independent Administrative Agency, Semi-Governmental Corporation	110	2,023,287
Private Corporation	175	780,889
Other University	1	800
Nonprofit Foundation, Charitable Organization	21	43,320
Foreign Country	7	46,816
Other	5	22,600
Total	**389**	**5,762,275**

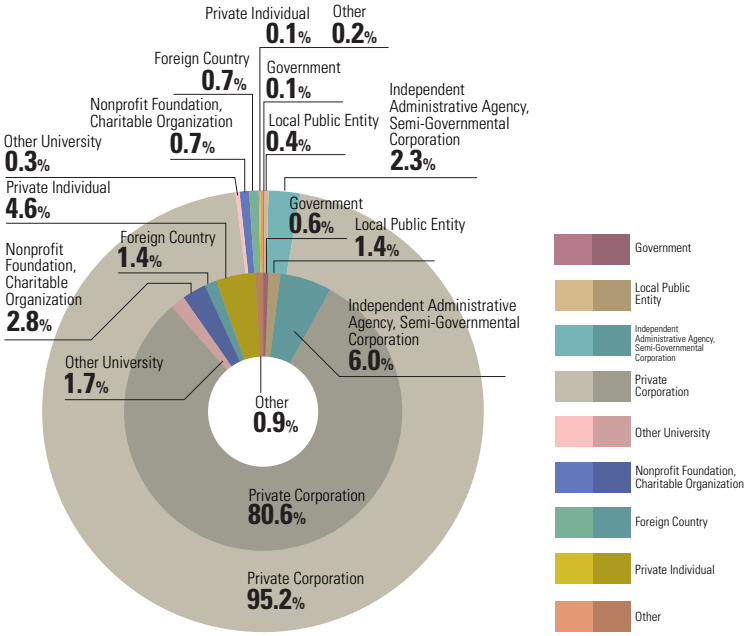
Commissioned Research Expenses by External Entity Type

(Amount (outer ring), Number of Projects (inner ring))



Joint Research Expenses by External Entity Type

(Amount (outer ring), Number of Projects (inner ring))



Joint Research Expenses by External Entity Type

Thousand yen

Type of External Entity	Number of Projects	Amount
Government	2	945
Local Public Entity	5	5,105
Independent Administrative Agency, Semi-Governmental Corporation	21	34,206
Private Corporation	283	1,396,576
Other University	6	5,000
Nonprofit Foundation, Charitable Organization	10	9,992
Foreign Country	5	9,849
Private Individual	16	1,568
Other	3	3,066
Total	**351**	**1,466,307**

3. Research Funds by Campus

At Keio University, each campus has an Office of Research Administration that manages research funds. Classifying research funds by campus shows that Shinanomachi Campus (home of School/Graduate School of Medicine) accounts for the largest number of projects and the largest amount in yen, followed in both categories by the Yagami Campus (home of the Faculty/Graduate School of Science and Technology).

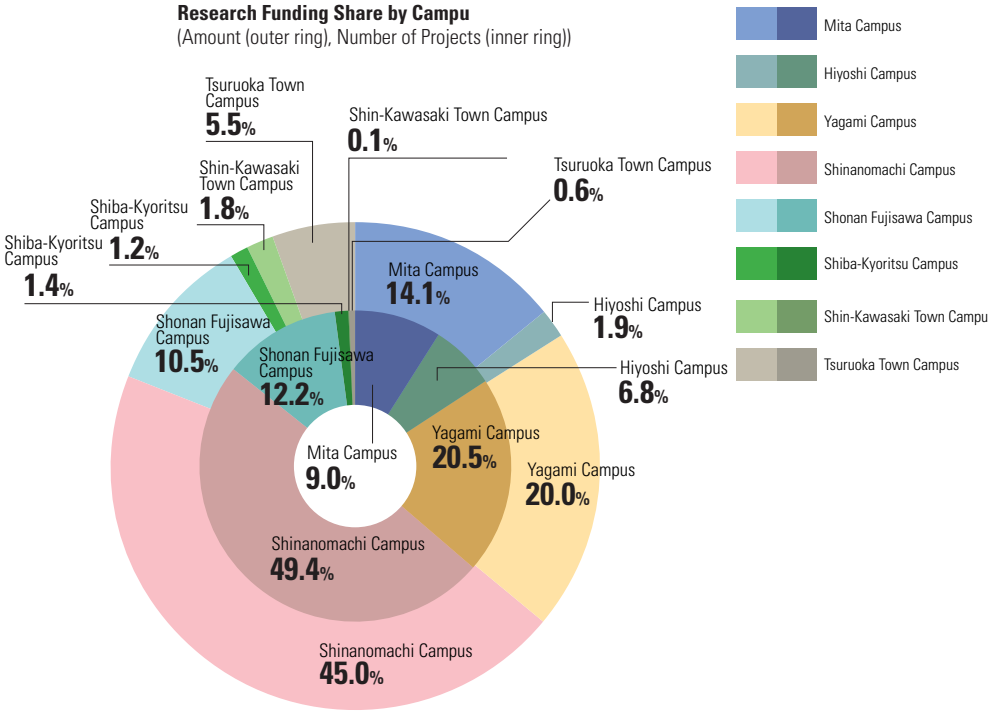
*The totals are compiled based on the home campus (in principle, the affiliation of the research project representative). However, the actual research may take place at a different campus.

Thousand yen

Campus	Number of Projects	Amount
Mita Campus	326	2,439,417
Hiyoshi Campus	247	326,532
Yagami Campus	746	3,439,139
Shinanomachi Campus	1,795	7,761,599
Shonan Fujisawa Campus	444	1,815,564
Shiba-Kyoritsu Campus	49	198,543
Shin-Kawasaki Town Campus	2	310,304
Tsuruoka Town Campus	22	941,124
Total	**3,631**	**17,232,222**

Research Funding Share by Campu

(Amount (outer ring), Number of Projects (inner ring))



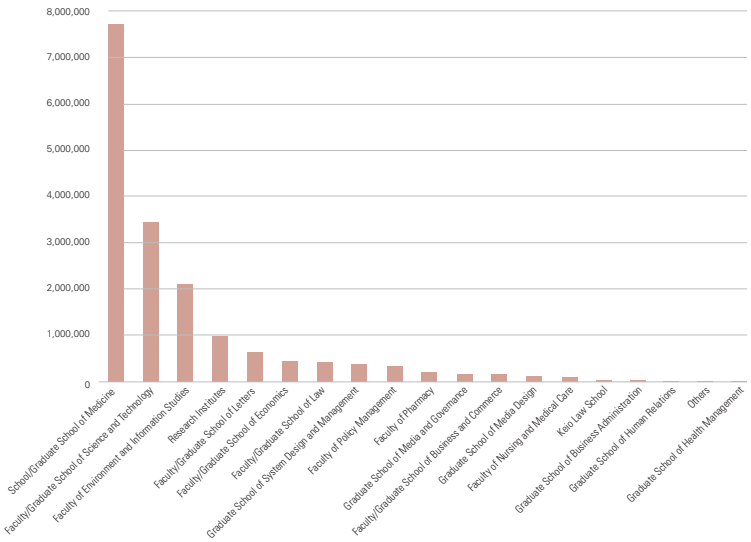
4. Research Funds by Affiliation of Researchers

Classifying funds by affiliation of researcher (in principle, the research representative) shows that the School/Graduate School of Medicine accounts for the largest number of projects and amount in yen, followed by the Faculty/Graduate School of Science and Technology.

Thousand yen

Affiliation of Researcher	Number of Projects	Amount
Faculty/Graduate School of Letters	128	644,685
Faculty/Graduate School of Economics	108	444,658
Faculty/Graduate School of Law	74	421,959
Faculty/Graduate School of Business and Commerce	79	156,961
School/Graduate School of Medicine	1,799	7,699,194
Faculty/Graduate School of Science and Technology	757	3,431,855
Faculty of Policy Management	160	325,597
Faculty of Environment and Information Studies	224	2,106,073
Faculty of Nursing and Medical Care	33	102,615
Faculty of Pharmacy	49	198,543
Graduate School of Human Relations	3	7,950
Graduate School of Media and Governance	47	166,076
Graduate School of Health Management	1	1,000
Graduate School of Business Administration	24	24,644
Graduate School of System Design and Management	31	367,489
Graduate School of Media Design	25	125,265
Keio Law School	32	28,880
Research Institutes	56	976,778
Others	1	2,000
Total	**3,631**	**17,232,222**

Research Funds by Researcher Affiliation (in order of amount)



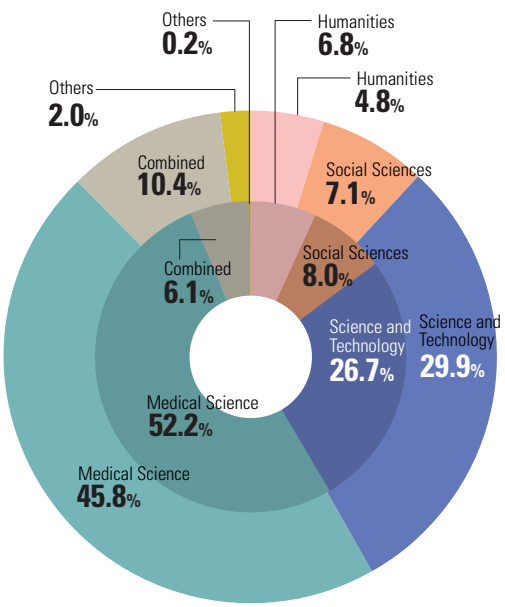
5. Research Funds by Field

Classifying research funds by field shows that medical science accounts for the largest number of projects and the largest amount in yen. The field classifications were derived from the MIC (Ministry of Internal Affairs and Communications) Survey of Research and Development and research expense surveys by the Japan Association of Private Colleges and Universities.

Thousand yen

Research Field	Number of Projects	Amount
Humanities	245	821,011
Social Sciences	293	1,216,533
Science and Technology	970	5,161,007
Medical Science	1,894	7,898,727
Combined	220	1,792,828
Others	9	342,116
Total	**3,631**	**17,232,222**

Research Funding Share by Field
(Amount (outer ring), Number of Projects (inner ring))



Definition

Humanities:
History, Philosophy, Literature, Languages, and other humanities.

Social Sciences:
Economics, Sociology, Business and Commerce, Political Science, Law, and other social sciences.

Science and Technology:
Applied Chemistry, Chemistry, Mechanics and Shipbuilding, Engineering, Mathematics, Electrics, Communications, Physics, and other science and technology.

Medical Science:
Medicine, Nursing, Pharmaceutical Science, and other health and medical sciences.

Combined:
Interdisciplinary fields.

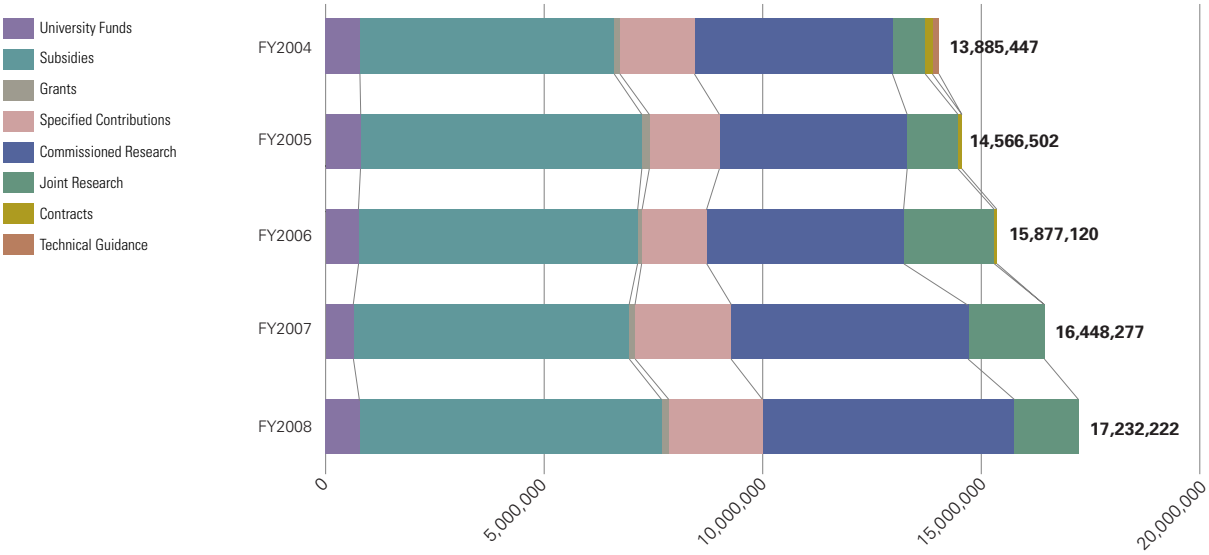
6. Research Fund Data over Past 5 Years

The table shows that research funding over the past five years (FY2004 to FY2008) has been increasing. Looking at research funds by type reveals a sharp increase in commissioned research projects.

Research Funds by Type over Past 5 Years

Thousand yen

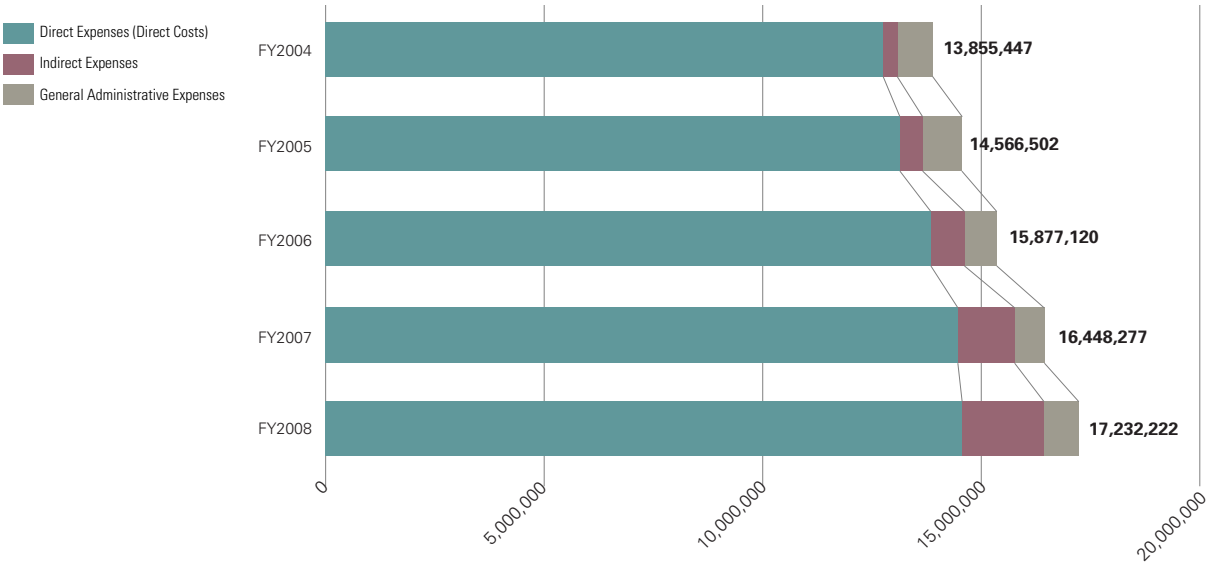
Type of Research Funds	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
University Funds	416,014	798,164	749,592	630,666	781,824
Subsidies	6,186,984	6,436,472	6,387,754	6,317,761	6,910,061
Grants	131,297	171,421	104,794	134,381	166,903
Specified Contributions	1,704,757	1,604,521	2,063,242	2,194,895	2,142,860
Commissioned Research	4,926,284	4,296,684	4,438,734	5,424,980	5,762,275
Joint Research	355,713	1,163,996	2,073,601	1,742,299	1,466,307
Contracts	164,248	88,499	59,403	1,995	290
Technical Guidance	150	6,745	0	1,300	1,702
Total	**13,885,447**	**14,566,502**	**15,877,120**	**16,448,277**	**17,232,222**



Direct Research Expenses, Indirect Research Expenses, and General Administrative Expenses over the Past 5 Years

Thousand yen

Type of Research Funds	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Direct Expenses (Direct Costs)	12,754,240	13,137,388	14,142,780	14,467,728	14,563,048
Indirect Expenses	321,228	529,791	781,735	1,305,746	1,873,112
General Administrative Expenses	809,979	899,323	952,605	674,803	796,062
Total	**13,885,447**	**14,566,502**	**15,877,120**	**16,448,277**	**17,232,222**



Researchers at Keio University in FY2008

This section presents data from FY2008 on researchers involved in research and education at Keio University (professors, associate professors, assistant professors and instructors), doctoral students and awardees of doctor's degrees, and researchers participating in research projects at Keio University but not affiliated under the any of above conditions.

1 Number of Researchers

"Tenured researchers" are those employed under full-time contracts without fixed terms. "Researchers with fixed period contract" are either full-time or part-time. Of those with fixed period contracts, "special research professors" are paid by research funds allocated from outside Keio University as a condition of appointment.

"Researchers" in the following data only include researchers in the University (Professors, Associate Professors, Assistant Professors and Instructors) and excludes teachers at affiliated elementary and secondary schools of Keio University. The number of the non-tenured researchers (that is, the total number of researchers with fixed period contracts and special research professors) accounts for 24% overall, but is a striking 45% at Shonan Fujisawa Campus.

Number of people

Campus	Tenured Researchers	Researchers with Fixed Period Contract	Special Research Professors	Total
Mita	374	36	40	450
Hiyoshi	311	23	5	339
Yagami	238	24	29	291
Shinanomachi	493	8	220	721
Shonan Fujisawa	129	43	64	236
Shiba-Kyoritsu	62	2	0	64
Total	**1,607**	**136**	**358**	**2,101**

As of 1 May 2008

2 Support for Future Researchers

There are two types of doctor's degrees: course and dissertation doctorates. Course doctorates are conferred upon completion of course work with all other requirements. Dissertation doctorates are conferred on those who have submitted a dissertation with consent of a committee of a graduate school, and passed the examination by a board of review.

The standard period for completion of a doctoral course is three years, except for the Graduate School of Medicine, which maintains a four year standard.

Number of Doctorates Awarded

Number of people

Course Doctorate	
Graduate School of Letters	7
Graduate School of Economics	7
Graduate School of Law	6
Graduate School of Human Relations	10
Graduate School of Business and Commerce	9
Graduate School of Medicine	46
Graduate School of Science and Technology	97
Graduate School of Business Administration	4
Graduate School of Media and Governance	28
Graduate School of Pharmaceutical Sciences	4
Subtotal	**218**

Dissertation Doctorate	
Graduate School of Letters	4
Graduate School of Economics	3
Graduate School of Law	2
Graduate School of Human Relations	1
Graduate School of Business and Commerce	3
Graduate School of Medicine	62
Graduate School of Science and Technology	4
Graduate School of Business Administration	0
Graduate School of Media and Governance	1
Graduate School of Pharmaceutical Sciences	1
Subtotal	**81**
Total	**299**

As of 31 March 2009

Number of Students Registered in Doctoral Courses

Number of people

Graduate School of Letters	〈 45〉	124
Graduate School of Economics	〈 15〉	47
Graduate School of Law	〈 30〉	82
Graduate School of Human Relations	〈 11〉	54
Graduate School of Business and Commerce	〈 20〉	45
Graduate School of Medicine *	〈 68〉	220
Graduate School of Science and Technology	〈150〉	333
Graduate School of Business Administration	〈 8〉	13
Graduate School of Media and Governance	〈 50〉	164
Graduate School of Health Management	〈 10〉	18
Graduate School of System Design and Managemen	〈 11〉	24
Graduate School of Media Design	〈 10〉	15
Graduate School of Pharmaceutical Sciences	〈 6〉	32
Total		**1,171**

As of 1 May 2008

Figures in parentheses indicate the maximum number of entrants for the graduate school.

*The figure for the Graduate School of Medicine refers to the number of students registered in doctoral courses.

3 Researchers from Outside Keio

Keio University has long emphasized the creation of an environment conducive for intellectual exchange and synergistic cooperation with researchers both within and outside the institution, with the goal of sharing common or related research subject.
Not only undergraduate faculty/graduate school but also research institutes of Keio University accept researchers from other research institutions and universities.

Number of Researchers Accepted—Breakdown by Job Title and Status

Number of people

Job Title/Status of Researchers	Number of Researchers	Qualifications
Research Associates of Faculty of Science and Technology (Yagami)	32	Researchers participating in research without a contract of commissioned research.
Researchers of Keio Leading-edge Laboratory of Science and Technology (KLL) (Yagami)	67	Researchers participating in research under a commissioned research contract.
School of Medicine Researcher (Shinanomachi)	268	Researchers employed by research, educational, or medical institutions other than the School of Medicine of Keio University.
Senior Visiting Researchers, Keio Research Institute at SFC (Shonan Fujisawa)	271	Researchers accepted by Keio Research Institute at SFC upon application from an institution not affiliated with Keio University, or that from the applicant him/herself. Applicants must have a master's degree or qualified as equivalent having experience and achievements as an independent researcher.
Visiting Researchers, Keio Research Institute at SFC (Shonan Fujisawa)	118	Researchers accepted by Keio Research Institute at SFC upon application from an institution not affiliated with Keio University or from the applicant him/herself. Applicants must have a bachelor's degree or qualified as equivalent having experience and achievements as an independent researcher.
Joint Researcher, Faculty of Pharmacy (Shiba-Kyoritsu)	20	Researchers participating in research under a commissioned research contract.
Research Affiliate, Keio Advanced Research Centers (KARC) (at each campus)	116	Persons from outside Keio University pursuing internal projects for Keio Advanced Research Centers (KARC)
Visiting Professors and Researchers *1 (See Table A)	356	
Others (See Table B)	464	
Total	**1,712**	

Table A: Visiting Professors and Researchers

Number of people

Job Title, Status	Mita/Hiyoshi	Yagami	Shinanomachi	Shonan Fujisawa	Shiba-Kyoritsu	Total
Visiting Professor	42	25	12	0	1	80
Visiting Associate Professor	16	11	12	0	0	39
Visiting Lecture	13	6	6	1	0	26
Visiting Instructor	2	2	1	0	0	5
Visiting Research Fellow	61	47	57	2	2	169
Visiting Junior Research Fellow	18	13	2	1	3	37
Total	**152**	**104**	**90**	**4**	**6**	**356**

Table B: Others

Number of people

Research Institute	No. of Researchers at Keio University*2	No. of Researchers not Employed by Keio	Total
Institute of Cultural and Linguistic Studies (Mita)	27	40	67
Institute for Media and Communications Research (Mita)	8	34	42
Keio Economic Observatory (Mita)	36	42	78
Shido Bunko, Institute of Oriental Classics (Mita)	8	2	10
International Center (Mita)	63	37	100
Teacher Training Center (Mita)	44	47	91
Fukuzawa Memorial Center for Modern Japanese Studies (Mita)	28	39	67
Institute of East Asian Studies (Mita)	21	46	67
Center for Japanese Studies (Mita)	8	40	48
Research Center for the Arts and Arts Administration (Mita)	18	13	31
Global Security Research Institute (G-SEC) (Mita)	30	32	62
Research Institute for Digital Media and Content (DMC) (Mita)	95	20	115
Institute of Physical Education (Hiyoshi)	20	36	56
Health Center (Hiyoshi)	15	0	15
Keio Research Center for Foreign Language Education (Hiyoshi)	60	19	79
Sports Medicine Research Center (Hiyoshi)	8	11	19
Keio Research Center for the Liberal Arts (Hiyoshi)	215	6	221
Total	**704**	**464**	**1,168**

Figures show the totals for FY2008
Place names in parentheses indicate location of the institution.

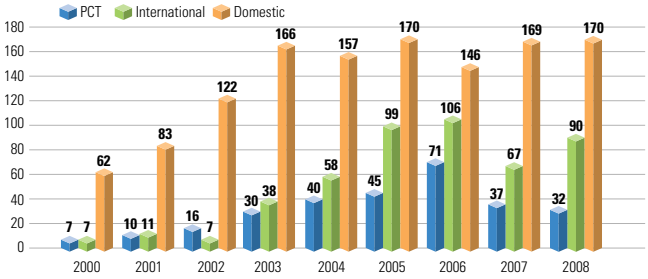
*1 Generic designation used for visiting professor, visiting associate professor, visiting lecture, visiting instructor, visiting research fellow and visiting junior research fellow. (Excludes researchers at Keio listed in Table B).
*2 Researchers at Keio University: the figure indicates total number of researchers including teachers in the affiliated elementary and secondary schools of Keio, in addition to tenured and non-tenured researchers of undergraduate faculties/graduate schools or research institutes. A researcher affiliated to more than two institutions is counted as one researcher of each.

Intellectual Property and Technology Transfer

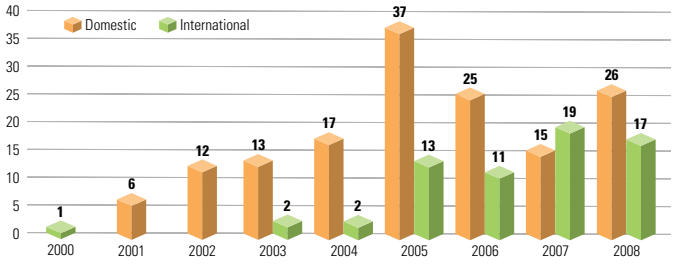
1 Intellectual Property

In FY2008, the IPC continued to engage in steady patent application activity with 170 domestic patent applications, 32 PCT applications, and 90 international patent applications. The center also registered 26 domestic patents and 17 international patents.

Patent Applications



Registered Patents



2008 Domestic Patent Applications

Applications by Technology Field

Bio / Medical	34%
Information / Communication	29%
Control / Measurement	16%
Materials / Chemicals	21%

Applications by Campus

Yagami (Faculty of Science and Technology) Campus	98
Shinamachi (School of Medicine) Campus	34
SFC	18
Mita Campus	7
Hiyoshi Campus	8
Shiba-Kyoritsu campus	8

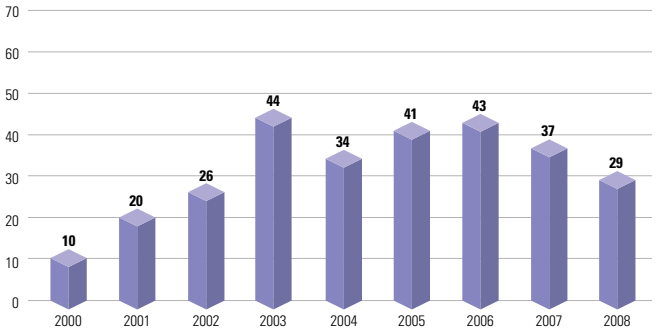
Total Patent Applications by Inventor

Professors	94
Associate Professors	35
Senior Assistant Professore	19
Assistant Professor and Research Associate	10
Students and others	11
Employee	1

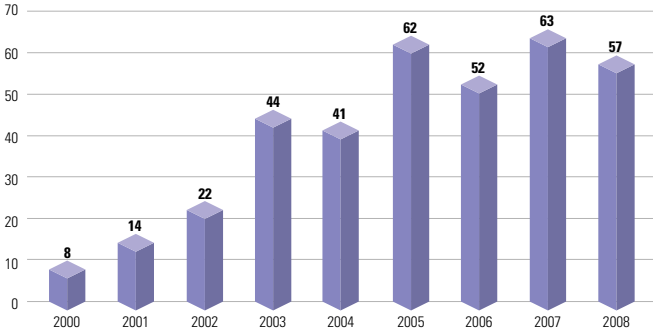
2 Technology Transfer

The IPC technology transfer officer ensures the smooth transfer of technology from university to industry. Technology transfers are conducted in the following three forms:
(I) Licensing of Keio University's intellectual property to companies
(II) Start UP venture companies based on Keio University's intellectual property
(III) Creation of joint research companies based on Keio University's intellectual property, and continuation of development activities in that company
In FY2008, the IPC made 29 new licensing agreements with companies. Total license income in FY2008 increased to 55.49 million yen.

Number of New Licensing Agreements

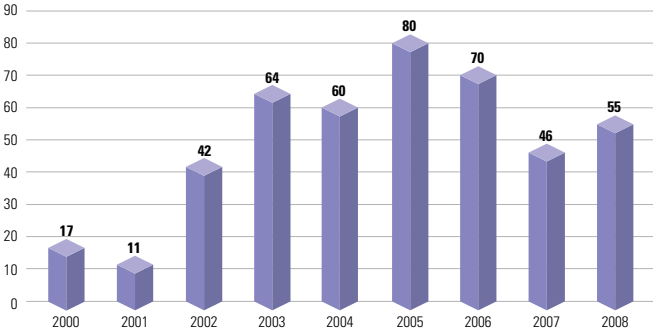


Income-Generating Licenses

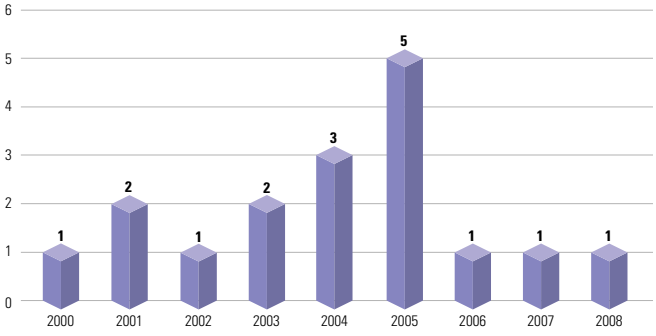


Licensing Revenues

Million yen



IP-Based Ventures (Start ups)



The IPC collaborates with the Keio University Incubation Center to support the establishment of venture businesses. In FY2008, one company established based on Keio IP was launched: AISSY, Inc. Thus far a total of 17 companies have been established, with Keio University holding an equity stake in 13 of them.

Awards for Research Activities, FY2008

Source: *Keio Gijyuku Ho (Keio Biweekly Newsletter)* and Keio University homepage. Entries arranged by date of award.

Date Awarded (YYYY/MM/DD)	Recipient (s)	Award	Reason for Award	Awarding Institution
2008/04/15	Akira Kato (Professor, Graduate School of Media Design) and Others	The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology	Research on TCP Communcation in Very Long-fat Pipe Environments, and as Its Result Establishment of Ten Internet2 Land Speed Records.	Minister of Education, Culture, Sports, Science and Technology
2008/04/19	Akiko Takeda (Assistant Professor, Faculty of Science and Technology)	FUNAI Information Technology Award for Young Researchers	For the Study: Equipment Investment Planning under Uncertainty	Funai Foundation For Information Technology
2008/04/21	Takashi Maeno (Professor, Graduate School of System Design and Management)	Achievements Award from JSME Machine Design and Tribology Division	Due to Achievements on Actuators, Sensors and Robots	The Japan Society of Mechanical Engineers, Machine Design & Tribology Division
2008/05/08	Yuichiro Anzai (President, Professor, Faculty of Science and Technology)	Medal with Purple Ribbon	In Recognition of Distinguished Achievement Information Science, in Particular, Cognitive Science Related to Learning Processes Related to Thinking and Problem Solving and in Research Related to Human-Robot Interaction	Cabinet Office, Government of Japan
2008/05/10	Masako Takahashi (Assistant Professor, Faculy of Science and Technology)	The Prize of Business Analysis Accosiation	The Impact of Monetary Valuation of Corporate Environmental Performance on Economic Performance and Environmental Accounting: Applicability of LIME and JEPIX.	Business Analysis Association
2008/05/23	Yoshiyuki Matsuoka (Professor, Faculty of Science and Technology) Yoshiki Ujiie (Research Associate (Non-tenured), Faculty of Science and Technology) and Others	The Prize of Paper	For the Paper Entitled "Proposal of Measures of Robustness for an Objective Characteristic with Non-normal Distribution"	Japan Society for Design Engineering
2008/05/23	Kouhei Ohnishi (Professor, Faculty of Scinece and Technology)	IEEJ Outstanding Achievement Award	For Pioneering Contributions to Motion Control Technology and Distinguished Services to the IEEJ	The Institute of Electrical Engineers of Japan
2008/05/28	Hidekazu Nishimura (Professor, Graduate School of System Design and Management)	IBM Faculty Awards	"In Recognition of Research in Model-driven Systems Development for Collaborative and Distributed Product Engineering in the Industrial Sector"	IBM Corporation
2008/06/02	Jiro Kokuryo (Professor, Faculty of Policy Management)	Fiscal Year 2008 MIC Info-Communications Promotion Month Ministerial Commendation (Individual)	In Recognition of Taking a Central Role in Deciding on Policy to Improve Productivity based on the Utilization of Information and Communication Technology and Contributing Greatly to the Development of Information and Communication as a Member of the "Special Ubiquitous Zone Project"	Ministry of Internal Affairs and Communications
2008/06/06	Takashi Maeno (Professor, Graduate School of System Design and Management)	Achievements Award from JSME Robotics and Mechatronics Division	Due to Achievements on Ultrasonic Actuators and Tactile Devises	The Japan Society of Mechanical Engineers, Robotics and Mechatronics Division
2008/06/14	Yoshihiro Yokoyama (Associate Professor, Faculty of Science and Technology)	Die Preise der Japanischen Gesellschaft für Germanistik für das Jahr 2006 (Preiskategorie: Wissenschaftliche Arbeiten in Buchform in deutscher Sprache)	For Work Entitled "Lemmatisierte Konkordanz zu Wirnts von Grafenberg ‹Wigalois›. Bearbeitet von Yoshihiro Yokoyama unter Mitarbeit von Ute Recker-Hamm. Max Niemeyer Verlag, Tübingen 2006 (Indices zur deutschen Literatur; Band 39) "	Japan-Germany Literary Society
2008/06/26	Kouji Noguchi (Associate Professor, Faculty of Pharmacy)	Research Incentive Award, The Japanese Association for Molecular Target Therapy of Cancer	In Recognition of Molecular Target Research to Develop Chemotherapy Against Cancer-related Viruses	Japanese Association for Molecular Target Therapy of Cancer
2008/06/29	Masafumi Hagiwara (Professor, Faculty of Science and Technology) and Others	Good Presentation Award	According to the Presentation "Ikebana Support System Considering Sense of Beauty"	Japanese Society for the Science of Design
2008/08/12	Hitoshi Mitsuhashi (Associate Professor, Faculty of Business and Commerce)	Distinguised Paper Award	For the Paper Entitled "Built to Last but Falling Apart: Cohesion, Friction and the Durability of Interfirm Alliances"	Academy of Management
2008/09/02	Seiichiro Katsura (Assistant Professor, Faculty of Science and Technology)	EPE-PEMC'08 Best Paper Award	For the Paper Entitled "Wideband Force Sensing for Haptic Energy Transmission Utilizing FPGA".	EPE-PEMC Council
2008/09/21	Norihiko Sugimoto (Assistant Professor, Faculty of Law)	Young Researcher Award from IEEE Computational Intelligence Society (IEEE CIS)	For the Paper Entitled "Application of High Speed Spherial Self-organizing Map to Climate Research"	Joint 4th International Conference on Soft Computing Systems (SCIS) and 9th International Symposium on Adavanced Intelligent Systems (ISIS)
2008/11/01	Yoshiki Ujiie (Research Associate (Non-tenured), Faculty of Science and Technology)	Research Encouragement Award	Clarification of Macroscopic Shape Information and Its Application to Design	Japanese Society for the Science of Design
2008/11/02	Yasuaki Einaga (Associate Professor, Faulty of Science and Technology	APA (Asian and Oceanian Photochemistry Association) Prize for Young Scientist	Contributions to "Development of Novel Photo-functional Magnetic Materials".	The Asian and Oceanian Photochemistry Association
2008/11/11	Hitoshi Abe (Research Associate, Faculty of Science and Technology)	Best Poster Prize, International Symposium on Surface Science and Nanotechnology 5 (ISSS-5)	For the Presentation of "CO Adsorption Effects on the Magnetism and Surface Structure of Fe/Cu (001)"	The Surface Science Society of Japan
2008/11/13	Masayuki Hashiguchi (Accosiate Professor, Faculty of Pharmacy)	1st Research Grand Prize of Japan Research Foundation for Clinical Pharmacology	In Recognition of the Paper Entitled "Clinical Pharmacology Research to Establish Individualized Methotrexate-based Therapy for Rheumatoid Arthritis"	Japan Research Foundation for Clinical Pharmacology
2008/11/14	Hideyuki Maki (Research Associate, Faculty of Science and Technology)	The 45th Japan Electronic Material Society Autumn Meeting Award	Bandgap Tuning of a Carbon Nanotube with an Uniaxial Strain, and Application to Optoelectronic Devices	Japan Electronic Material Society
2008/11/21	Yasuhiro Kakinuma (Assistant Professor, Faculty of Science and Technology)	Manufacturing and Machine Tool Award for Academic Achievement	For the Paper Entitled "Application of Electro-rheological Gel to Fixture Devices for Micro Milling Processes"	The Japan Society of Mechanical Engineers Manufacuturing and Machine Tool Division

Date Awarded (YYYY/MM/DD)	Recipient (s)	Award	Reason for Award	Awarding Institution
2008/12/01	Hideko Kanazawa (Professor, Faculty of Pharmacy)	Award of the Society for Chromatographic Sciences, Japan (2008)	Development of Novel Thermally-Responsible Sapatarion Systems Using Functional Polymers	The Society of Chromatographic Sciences
2008/12/22	Atsuhiro Yamada (Associate Professor, Faculty of Economics) and Others	4th Outstanding Performance Award of Institute for Health Economics and Policy	In Recognition of the Paper Entitled "Utilization Experiment on Nursing-care Insurance and the Fairness of Nursing-care Service"	Institute for Health Economics and Policy
2009/03/09	Kohei Itoh (Professor, Faculty of Science and Technology)	JSPS Prize	Establishment of Semiconductor Isotope Engineering: Prof. Itoh has Proposed the Importance of Isotopic Control of Semiconductor Elements and Demonstrated Its Application to State-of-the-art LSI Technologies and Quantum Computer Development.	Japan Society for the Promotion of Science (JSPS)
2009/03/12	Seiichiro Katsura (Assistant Professor, Faculty of Science and Technology)	Yazaki Academic Award	Research Development of Multilateral Haptic Transmission Technology for Haptic Broadcasting	Yazaki Memorial Foundation for Science and Technology
2009/03/17	Daisuke Uemura (Professor, Faculty of Science and Technology)	The Naito Foundation Resaearch Prize	Exploratory Research on Bioactive Natural Products with Focus on Biological Phenomenon	The Naito Foundation
2009/03/18	Seiichiro Katsura (Assistant Professor, Faculty of Science and Technology)	2008 IEEE Excellent Presentaion Award	For the Paper Entitled "Extraction and Visualization of Writing Pressure by Haptic Pen"	The Institute of Electrical Engineers of Japan
2009/03/28	Masahide Takanashi (Co-ed Elementary School (Keio Yochisya), Teacher	The Chemical Society of Japan Award for Merits for Chemical Education for 2008	Practice and Dessemination of Science Education Developing Curiosity	The Chemical Society of Japan
2009/03/28	Atsushi Nakajima (Professor, Faculty of Science and Technology)	The Chemical Society of Japan Award for Creative Work for 2008	Study on Creation of Nano-scale Materials Based on Composite Clusters and Their Electronic Properties	The Chemical Society of Japan
2009/03/28	Teruhiko Matsubara (Assistant Professor, Faculty of Science and Technology)	Young Scholar Lecture Series of The Chemical Society of Japan for 2009	Special Lecture "Control of Cell Surface Glycoconjugate Functions by Peptides which are Selected from Random Library"	The Chemical Society of Japan
2009/03/29	Kazuhiro Sakai (Research Associate (Non-tenured), Faculty of Economics	Young Scientist Award of the Physical Society of Japan	For Work Entitled "Verification of AdS/CFT Correspondence Based on Integrability"	The Physical Society of Japan

Introduction to the Keio University research databases

K-RIS (Keio Research Information System)

K-RIS provides information on all researchers at Keio University. The database can be searched in various ways, including by keyword, researcher affiliation, or published paper.

http://www.k-ris.keio.ac.jp/index_en.html

Keio Leading-Edge Laboratory of Science and Technology (KLL) Yellow Pages

Introduction to the current research projects at the Yagami Campus, Science and Technology Department.

http://www.kll.keio.ac.jp/db/index.html

Keio Research Institute at SFC Yellow Pages

Introduction to the current research projects at the Shonan-Fujisawa Campus Research Institute

http://www.kri.sfc.keio.ac.jp/kris-yp/

Research-related Facilities and Libraries

Research Space for Rent

Keio University provides research space and incubation facilities for rent as indicated below. Policies and availability differ by campus, so please inquire in advance for vacancies, rental qualifications, application procedures, application deadlines, etc.

As of June 2009

Sousoukan Building on Yagami Campus

Facility	Outline	For Inquiries
Kyoseikan Collaboration Space (See pages 15-16)	Total of 5 rooms in Kyoseikan Building on Hiyoshi Campus Size: each room: 20.82m²; Total floor area: 104.10m²	•Kyousei-Kan Operations Center Tel. +81-45-564-2500 http://campus.hc.keio.ac.jp/kyoseikan/ E-mail: hc-kyoseikan@adst.keio.ac.jp
Research Space at the KLL (See pages 17-18)	Total of 31 rooms in Sousoukan Building on Yagami Campus Size: 66.12m² - 102.49m² ; Total floor area: 2,245m² Type A (for chemistry and biology experiments) Type B (for applied physics experiments) Type C (for experiments for heavy materials) Type D (for experiments for light-weight equipments) Type E (for various types of experiments)	•Secretariat of the KLL (c/o Office of Research Administration, Yagami Campus) Tel. +81-45-566-1794 http://www.kll.keio.ac.jp/ E-mail:staff@kll.keio.ac.jp •KLL Liaison Office http://www.kll.keio.ac.jp/liaison/
Shinanomachi Research Park (See pages 19-20)	56 units in the Institute of Integrated Medical Research Building Steel frame with a reinforced concrete structure; 2 under ground floors, 9 above ground floors, and one penthouse floor Total floor area: 24,400m²	•Shinanomachi Office of Research Administration Tel. +81-3-5363-3879 http://www.med.keio.ac.jp/research/ E-mail: ras-shinanomachi@adst.keio.ac.jp •Center for Integrated Medical Research http://www.cimr.med.keio.ac.jp/

Keio Fujisawa Innovation Village

Keio Fujisawa Innovation Village (SFC-IV) (See page 22)	Steel frame structure, 2 floors Site area: 1,825.3m² Total floor area: 1,470.0m² Rental space: 906.4m² offices: 18; small offices: 3; shared offices: 8 R&D fabrication rooms: 3; office/R&D fabrication rooms: 2 server room: 1	•Keio Fujisawa Innovation IM Room Tel. +81-466-49-3910 http://www.sfc-iv.jp/index.html E-mail: incubation@sfc-iv.jp
Shin-Kawasaki Town Campus (See page 25-26)	Four research buildings Steel-frame structure, 2 floors Total floor area: 5,336.11 m²	•Shin-Kawasaki Town Campus Shin-Kawasaki Frontier Research and Education Collaborative Square Tel. +81-44-580-1580 http://www.k2.keio.ac.jp E-mail: k2-tc@adst.keio.ac.jp
Tsuruoka Metabolome Campus (Tsuruoka Leading-Edge Research Industrial Support Center - not a Keio facility.) (See page 28)	29 units, Size: 7m x 10m x 2.8m Steel frame structure, 2 floors Total floor area: approximately 3,700m²	•Planning and Coordinating Division, Department of General Affairs, Tsuruoka City Tel. +81-235-25-2111(ext. 321) http://www.city.tsuruoka.lg.jp/ E-mail:kikaku@city.tsuruoka.yamagata.jp

Library Collections

Keio University has six campuses: Mita, Hiyoshi, Shinanomachi, Yagami, Shonan Fujisawa, and Shiba-Kyoritsu, each one of them developing leading-edge research and education in various disciplines, and also high-level medical practice. The Media Centers, centering the library service, branch on each campus to provide intensive support for all these specific activities.

As of March 31, 2009

	Book Stocks	Collections by Material Type					Number of Seats
	Total	Domestic Books	Foreign Books	Domestic Journals	Foreign Journals	Non-book Materials (items)	
Mita Media Center	2,663,320	955,556	1,036,894	246,773	291,222	132,875	1,324
Hiyoshi Media Center	873,569	470,490	224,990	68,717	72,802	36,570	1,433
Shinanomachi Media Centerr	403,843	70,232	50,809	90,277	185,980	6,545	226
Information and Media Center for Science and Technology	364,704	94,363	44,614	56,466	165,280	3,981	475
Shonan Fujisawa Media Center	407,643	222,570	86,298	46,668	25,786	26,321	1,080
Information and Media Center for Pharmaceutical Sciences	70,661	39,061	5,132	7,395	17,592	1,481	141
Total	**4,783,740**	**1,852,272**	**1,448,737**	**516,296**	**758,662**	**207,773**	**4,679**

There are also electronic media resources (348 databases, 42,369 electronic journals, and 11,784 electronic books).
In the Hiyoshi Media Center, the collections of the Kyousei-Kan library (Business Management graduate courses, Systems, Management graduate courses, and Media Design graduate courses) were included from FY2008.

New University Library at Mita Media Center

Hiyoshi Media Center

Shinanomachi Media Center

FY2008 Financial Position

Ended on March 31, 2009

1 Balance Sheet

Million yen

Assets	
Fixed assets	**323,271**
Tangible fixed assets	207,149
Land	33,956
Buildings	103,923
Structures	4,988
Equipment and supplies for education and research	23,693
Other equipment and supplies	566
Books	39,525
Vehicles	22
Construction in progress	475
Other fixed assets	116,122
Land lease rights	0
Telephone subscription rights	72
Facility use rights	187
Deposits	22
Profit-making business capital	5,692
Long-term loans	1,832
Specified assets *1	62,920
School bond assets producing interest	4,997
Reserve assets for the third fund	40,399
Current assets	**45,953**
Cash deposits	25,385
Accounts receivable	13,792
Inventories	523
Negotiable securities	5,152
Assets for school trip deposits	92
Others	1,008
Assets total	**369,224**

Liabilities	
Fixed liabilities	**65,718**
Long-term borrowings	14,689
School bonds	3,558
Retirement allowance reserve	28,530
Pension reserve	18,941
Current liabilities	**37,247**
Short-term borrowings *2	2,979
School bonds *2	1,439
Accounts payable	17,340
Advances received	13,312
Deposits	2,086
School trip deposits	92
Liabilities total	**102,965**

Funds	
Funds	
First fund *3	305,561
Second fund *4	15,450
Third fund *5	40,399
Fourth fund *6	9,076
Funds total	**370,485**

Balance of income and expenditure	
Carried forward to next year	104,226
Total of liabilities, funds, and balance of income and expenditure	**369,224**

Keio Corporate Administration "Jukukan-kyoku" at Mita Campus

*1 Specified assets
Assets reserved for specific purposes such as the "retirement allowance reserve," the "pension reserve," and the "Second Fund."

*2 Short-term borrowings and school bonds
Current portion of "long-term borrowings" and "school bonds (*Jukusai*)" expected to be repaired in FY2009.

*3 First Fund
Funds related to the acquisition and maintenance of fixed assets (acquisition cost of fixed assets such school land, school buildings, equipment and supplies, books, etc. acquired by self-financing).

*4 Second Fund
Fund related to future acquisition of fixed assets.

*5 Third Fund
Amount of assets related to scholarships and research funds.

*6 Fourth fund
Required working capital.

Source: *Activities and Financial Position of Keio Gijuku: FY2008 Business Report*

2 Income and Expenditure Statement

Million yen

Income	All of Keio (*Keio Gijuku*)	University only
Imputed income		
Tuition and other student fees	47,031	39,395
Other fees	2,468	2,169
Donations*1	22,648	3,275
Subsidies*2	14,422	12,275
Income from asset management	3,109	332
Asset sales differential	44	0
Income from business	9,061	8,703
Income from medical services	44,046	0
Miscellaneous income	3,739	3,004
Imputed income total	**146,566**	**69,154**
Transfer to capital fund	△ 25,319	△ 6,715
Income total	**121,246**	**62,439**

Expenditure	All of Keio (*Keio Gijuku*)	University only
Personnel	65,057	34,968
Expenses for education and research*3	59,968	32,918
Expenses for general administration	5,414	1,705
Interest on borrowings	391	151
Loss on disposition*4	17,232	258
Provision for allowance for doubtful accounts	92	0
Discretionary reserve	-	-
Total expenditure	**148,155**	**70,000**
Current excess over expenditure	26,908	-
Brought forward from last year	77,318	-
Carried forward to next year	104,226	-
Imputed income total - Total expenditure	**△ 1,589**	**△ 846**

*1 Donations
Due to consolidation, this includes approximately 4.3 billon yen in general donations and approximately 8.3 billion yen contributions in goods.

*2 Subsidies
In FY2008, subsidies from the Promotion and Mutual Aid Corporation for Private Schools in Japan (PMAC) totaled ¥8,863,615,000. General subsidies account for ¥6,170,065,000 of this amount and special subsidies account for ¥2,693,550,000. Since subsidies for Grants-in-Aid for Scientific Research are allocated to individual researchers, they are processed as deposits of the school juridical organization and thus are not reported in the subsidy revenue, which is considered to be imputed income in the financial statement. Accordingly, expenditures corresponding to these subsidies are also excluded from expenditures for education and research.

*3 Expenses for education and research
Research activities funded by subsidies such as Grants-in-Aid for Scientific Research (*Kakenhi*) are not included (please see *2 above)

*4 Loss on disposition
Approximately 17 billion yen is based on the valuation of financial assets.

Source*: Activities and Financial Position of Keio Gijuku: FY2008 Business Report*

Access Information

Mita Campus
2-15-45 Mita, Minato-ku, Tokyo 108-8345
Tel +81-3-5427-1517

- 8-minute walk from Tamachi St. (JR Yamanote Line or JR Keihin Tohoku Line);
  Approximately 10 minutes by train from Tokyo to Tamachi.
  Approximately 20 minutes by train from Ueno to Tamachi.
  Approximately 15 minutes by train from Shibuya to Tamachi.
- 7-minute walk from Mita St. (Asakusa or Mita Line);
  Approximately 15 minutes by train from Suidobashi to Mita.
- 8-minute walk from Akabanebashi St. (Oedo Line)

Shinanomachi Campus
35 Shinanomachi, Shinjuku-ku, Tokyo 160-8582
Tel +81-3-3353-1211

- 1-minute walk from Shinanomachi St. (JR Sobu Line);
  Approximately 6 minutes by train from Shinjuku to Shinanomachi.
  Approximately 15 minutes by train from Tokyo to Shinanomachi.
- 5-minute walk from Kokuritsu-kyogijo St. (Oedo Line)

Hiyoshi Campus
4-1-1 Hiyoshi, Kohoku-ku, Yokohama-shi,
Kanagawa 223-8521
Tel +81-45-566-1000

- 1-minute walk from Hiyoshi St. (Tokyu Toyoko Line or Yokohama Subway Line, Green Line);
  Approximately 25 minutes by train from Shibuya to Hiyoshi (20 minutes by express).
  Approximately 20 minutes by train from Yokohama to Hiyoshi (15 minutes by express).
  Approximately 20 minutes by train from Shin-Yokohama to Hiyoshi via Kikuna.

Shonan Fujisawa Campus
5322 Endo, Fujisawa-shi, Kanagawa 252-8520
Tel +81-466-47-5111

- Approximately 15 minutes by bus from Shonandai St. (Odakyu Enoshima Line, Sagami Tetsudo Izumino Line, or Yokohama Subway Line);
  Approximately 30 minutes by train from Yokohama to Shonandai.
- Approximately 25 minutes by bus from Tsujido St. (JR Tokaido Line);
  Approximately 30 minutes by train from Yokohama to Tsujido.

Yagami Campus
3-14-1 Hiyoshi, Kohoku-ku, Yokohama-shi,
Kanagawa 223-8522
Tel +81-45-566-1454

- 15-minute walk from Hiyoshi St. (Tokyu Toyoko Line or Yokohama Subway Line, Green Line);
  Approximately 25 minutes by train from Shibuya to Hiyoshi (20 minutes by express).
  Approximately 20 minuets by train from Yokohama to Hiyoshi (15 minutes by express).
  Approximately 20 minutes by train from Shin-Yokohama to Hiyoshi via Kikuna.
- Approximately 10 minutes by car from Shin-Kawasaki St. (JR Yokosuka Line);
  Approximately 20 minutes by train from Tokyo to Shin-Kawasaki
  Approximately 12 minutes by train from Shinagawa to Shin-Kawasaki.
  Approximately 9 minutes by train from Yokohama to Shin-Kawasaki.

Shiba-Kyoritsu Campus
1-5-30 ShibaKoen, Minato-ku, Tokyo 105-8512
Tel +81-3-3434-6241

- 10-minute walk from Hamamatsu-cho St. (JR Yamanote Line or Keihin-Tohoku Line)
  Approximately 6 minutes by train Tokyo to Hamamatsu-cho
  Approximately 13 minutes by train from Ueno to Hamamatsu-cho
  Approximately 16 minutes by train from Shibuya to Hamamatsu-cho
- 2-minute walk from Onarimon St. (Mita Line)
  Approximately 5 minutes from Ote-machi to Onarimon
  Approximately 35 minutes from Hiyoshi to Onarimon
- 6-minute walk from Daimon St. (Asakusa Line or Oedo Line)
  Approximately 16 minutes from Shinjuku to Daimon
  Approximately 7 minutes from Nihonbashi to Daimon

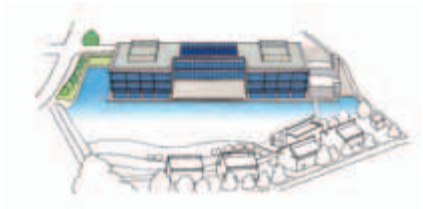
Shin-Kawasaki Town Campus

7-1 Shin-Kawasaki, Saiwai-ku, Kawasaki-shi, Kanagawa
212-0032
TEL+81-44-580-1580

- 10-minute walk from Shin-Kawasaki St. (JR Yokosuka Line); Approximately 20 minutes by train from Tokyo to Shin-Kawasaki. Approximately 12 minutes by train from Shinagawa to Shin-Kawasaki. Approximately 9 minutes by train from Yokohama to Shin-Kawasaki.
- 15-minute walk from Kashimada St. (JR Nambu Line); Approximately 7 minutes by train from Kawasaki to Kashimada.

Tsuruoka Town Campus

Center Building
14-1 Baba-cho, Tsuruoka-shi, Yamagata 997-0035
TEL +81-235-29-0800



Bio-lab
403-1 Nipponkoku, Daihouji, Tsuruoka-shi,
Yamagata 997-0017
TEL +81-235-29-0534

- By air: approximately 50 minutes from Tokyo Haneda Airport to Shonai Airport, approximately 25 and 18 minutes by car from Shonai Airport to Center Building and Bio-lab, respectively.
- By train: approximately 120 minutes by Joetsu Shinkansen (bullet train) from Tokyo St. to Niigata St., then approximately 120 minutes by Uetsu Honsen (main line) from Niigata St. to Tsuruoka St., then 5 minutes by car

Contact Information

Mita Campus

- ORAA: Organization for Research Advancement and Administration
oraa-jimukyoku@adst.keio.ac.jp
- CRP: Center for Research Promotion
crp@info.keio.ac.jp
- IPC: Intellectual Property Center
toiawasesaki-ipc@adst.keio.ac.jp
- Head Office of Research Administration
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- KIC: Keio Incubation Center
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- KARC: Keio Advanced Research Centers
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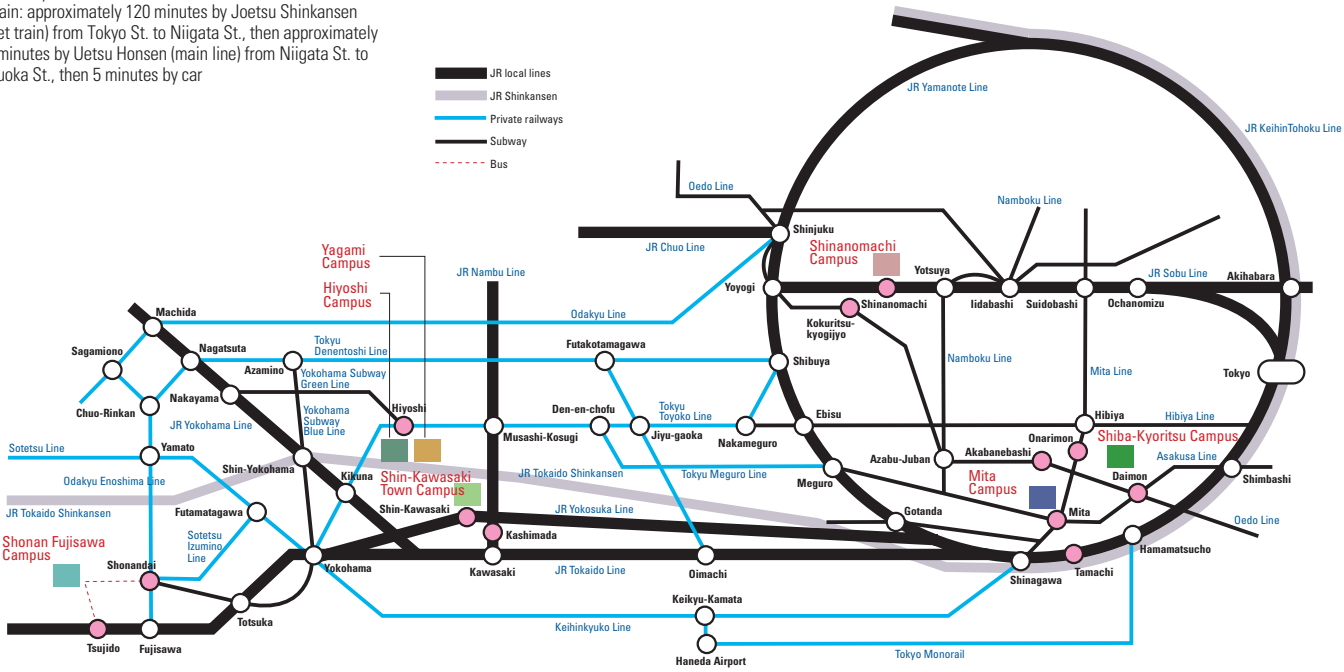

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